SDMS DocID 457922

Second Five-Year Review Report

for

Hocomonco Pond Superfund Site

Town of Westborough

Worcester County, Massachusetts

September 2009

PREPARED BY:

United States Environmental Protection Agency
Region 1
Boston, Massachusetts

Approved by: **Date:**

9-30-09

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ACRONYMS

AMEC	AMEC Earth & Environmental
ARAR	Applicable or Relevant and Appropriate Requirement
BBL	Blasland, Bouck & Lee, Inc.
BTEX	benzene, toluene, ethylbenzene, and xylenes
COC	Contaminant of Concern
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
cPAH	Carcinogenic polynuclear aromatic hydrocarbons
CSF	Cancer Slope Factor
DAF	dissolved air flotation
DL	Detection Limit
DNAPL	dense non-aqueous phase liquid
DPW	Department of Public Works
EPA	United States Environmental Protection Agency
ESD	Explanation of Significant Differences
LTM	long-term monitoring
LTMP	Long Term Monitoring Plan
MassDEP (also MADEP)	Massachusetts Department of Environmental Protection
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
MCP	Massachusetts Contingency Plan
ND	non detect
NM	not measured
NPL	National Priorities List
O&M	Operations and Maintenance
PAH	Polycyclic aromatic hydrocarbons
ppb	parts per billion
ppm	parts per million
PRP	Potentially Responsible Party
RAO	Remedial Action Objective
RCRA	Resource Conservation and Recovery Act
RfDs	EPA Risk Reference Doses
RI	Remedial Investigation
ROD	Record of Decision
SDD	Supplemental Decision Document
Site	Hocomonco Pond Superfund Site

ACRONYMS (cont.)

TI	technical impracticability
TOC	total organic carbon
TtNUS	Tetra Tech NUS, Inc.
µg/L	micrograms per liter
VOC	volatile organic compound

ES EXECUTIVE SUMMARY

This is the second five-year review for the Hocomonco Pond Superfund Site. The triggering action for this policy review was the signature date of the previous five-year review report on September 21, 2004. The five-year review is required since hazardous contamination remains at the site above levels that allow for unlimited use and unrestricted exposure. EPA prepared this five-year review in accordance with the EPA Comprehensive Five-Year Review Guidance, OSWER No. 9355.7-03B-P. Metcalf & Eddy, Inc. provided technical assistance to EPA in the preparation of this document.

The approximately 23-acre site is located in the Town of Westborough, Massachusetts. The site is bordered to the northwest by Hocomonco Pond, a 27-acre shallow freshwater pond, to the east by Otis Street and to the south by the Smith Valve Parkway.

The remedial investigation (RI) identified four primary areas of contamination on the site: (1) the Kettle Pond area; (2) Hocomonco Pond and its discharge stream; (3) the former lagoon area; and (4) Otis Street. In addition, the RI identified three small isolated areas. The predominant contaminants found in all the areas were creosote compounds, primarily polycyclic aromatic hydrocarbons (PAHs), such as acenaphthene, naphthalene, acenaphthylene, fluorene, phenanthrene, dibenzofuran, and 2-methylnaphthalene.

The September 30, 1985 Record of Decision (ROD) specified a multi-component remedy to address each of the areas of contamination at the site. The remedies selected involved excavation and dredging of contaminated soil, waste, and sediments from the Kettle Pond area, Hocomonco Pond and its discharge stream, Otis Street, and the three isolated areas, followed by disposal into the former lagoon or a double-lined landfill constructed on the site. The former lagoon area would be capped. The remedy also included dewatering Kettle Pond and lowering the groundwater level prior to and during excavation, relocating the storm drain pipe that was laid along the eastern side of the former lagoon, and sealing the open-jointed storm drainage pipe along the east side of Otis Street.

Pre-design investigations in the Kettle Pond area identified a number of issues, including extensive DNAPL contamination at depth. EPA issued an Explanation of Significant Differences (ESD) in 1992 that required active pumping to remove recoverable DNAPL and modified the requirement for dewatering as part of the remedy for the Kettle Pond area to implementation of bioremediation or other in-situ technologies to treat the deeper soils.

Following issuance of the ESD, EPA established cleanup levels for groundwater, sediments, and soil and established the limits of excavation in a 1992 Supplemental Decision Document (SDD). All excavation and dredging activities were completed by 1996 and certification reports documenting completion of the remedial activities were submitted and approved by EPA. DNAPL recovery operations, required by the 1992 ESD, began in 1995. The in-situ bioremediation system required by the 1992 ESD was constructed and began operation, but was not successful due to iron fouling. Other treatment alternatives were evaluated; the evaluation concluded that other treatment alternatives would have limited effectiveness due to the residual and free phase DNAPL present in the Kettle Pond area.

A technical impracticability (TI) investigation was completed in 1997 which identified two TI zones where groundwater restoration was deemed not practicable. A second ESD was issued by EPA in 1999 that waived compliance with the interim groundwater cleanup levels in the two TI zones and required continuation of DNAPL recovery and implementation of a long-term monitoring program (LTMP) to ensure that the plume would be contained and contamination would not increase in concentration or extent. The ESD stated that, "DNAPL recovery is ongoing and shall continue until such time that it can be demonstrated that it is no longer technically practicable."

Five-Year Review Protectiveness Statement:

The remedy currently protects human health and the environment because physical access to the site is restricted and there are no potable wells in use. However, in order for the remedy to be protective in the long-term, the following actions need to be taken; deed restrictions need to be finalized and recorded, and the studies and evaluations referenced in Section 9.0 will be completed to ensure long-term protectiveness.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site name *(from WasteLAN)*: Hocomonco Pond		
EPA ID *(from WasteLAN)*: MAD980732341		
Region: 1	**State:** MA	**City/County:** Westborough/Worcester
SITE STATUS		
NPL status: Final		
Remediation status (choose all that apply): Operating		
Multiple OUs?* No	**Construction completion date:** September 22, 1999	
Has site been put into reuse? No		
REVIEW STATUS		
Lead agency: EPA		
Author name: James M. DiLorenzo		
Author title: Remedial Project Manager	**Author affiliation:** EPA Region I	
Review period: 3/31/09 to 9/21/09		
Date(s) of site inspection: 7/7/09		
Type of review: Post-SARA		
Review number: 2 (second)		
Triggering action: Previous Five-Year Review report		
Triggering action date *(from WasteLAN)*: September 21, 2004		
Due date (five years after triggering action date): September 21, 2009		

* "OU" refers to operable unit.

Five-Year Review Summary Form, cont'd.

Issues:

- Required deed restrictions are not yet in place.
- Interim groundwater cleanup levels are exceeded at monitoring wells MLC-2 and MLC-3 outside of the former lagoon TI zone.
- Analytical reporting limit for cPAHs is too high.
- Arsenic and chromium data are not available for comparison to IGCLs.
- Dissolved-phase plume is not contained.
- DNAPL plume may not be contained.
- An accurate, up-to-date site monitoring and operations plan does not exist.

Recommendations and Follow-up Actions:

- Finalize and record deed restrictions by September 2010.
- Increase sampling frequency at MLC-2 and MLC-3 to semi-annual; Evaluate the extent of cleanup level exceedances and need for additional actions to achieve compliance by September 2010.
- Use analytical method 8270 (SIMS) to achieve lower reporting limits for PAHs beginning with the fall 2009 event.
- Conduct periodic groundwater sampling for arsenic and chromium at site monitoring wells beginning with the fall 2009 event.
- Perform additional studies to determine plume extent, discharge location, and presence of a significant exposure pathway; Evaluate opportunities for optimization of the current DNAPL recovery operations by September 2010
- Prepare an updated site monitoring and operations plan by September 2010.

Protectiveness Statement(s):

The remedy currently protects human health and the environment because physical access to the site is restricted and there are no potable wells in use. However, in order for the remedy to be protective in the long-term, the following actions need to be taken; deed restrictions need to be finalized and recorded, and the studies and evaluations referenced in Section 9.0 will be completed to ensure long-term protectiveness.

1.0 INTRODUCTION

The purpose of this five-year review is to determine if the remedy selected for the Hocomonco Pond Superfund Site (site) in Westborough, Massachusetts is protective of human health and the environment. This report summarizes the five-year review process, investigations and remedial actions undertaken at the site; evaluates the monitoring data collected; reviews, as appropriate, the Applicable or Relevant and Appropriate Requirements (ARARs) specified in the Record of Decision (ROD) for changes; discusses any issues identified during the review; and presents recommendations to address those issues.

The United States Environmental Protection Agency, Region 1 (EPA) prepared this five-year review pursuant to the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) §121 and the National Contingency Plan. CERCLA §121 states:

> "If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews."

The EPA interpreted this requirement further in the National Contingency Plan; 40 CFR §300.430(f)(4)(ii) states:

> "If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action."

The EPA conducted this five-year review of the remedial actions implemented at the Hocomonco Pond site in Westborough, Massachusetts. Metcalf & Eddy (M&E) provided technical assistance to EPA under the Response Action Contract (RAC) (Contract No. EP-S1-06-01). Assistance was also provided by the Massachusetts Department of Environmental Protection (MassDEP) and Beazer East, Inc., the Potentially Responsible Party (PRP). The work to prepare this review was performed between April and September 2009. The review was completed in accordance with the EPA Comprehensive Five-Year Review Guidance, OSWER No. 9355.7-03B-P.

This is the second five-year review for the site. The triggering action for this policy review was the completion of the first five-year review for the site, completed on September 21, 2004. The five-year review is required since hazardous contamination remains at the site above levels that allow for unlimited use and unrestricted exposure.

2.0 SITE CHRONOLOGY

TABLE 2-1
CHRONOLOGY OF SITE EVENTS
FIVE-YEAR REVIEW
HOCOMONCO POND SITE
WESTBOROUGH, MASSACHUSETTS

Event	Date
Montan Treating Company and American Lumber & Treating Company conducted wood-treating operations on the site.	1928-1946
Facility was converted to an asphalt mixing plant and later into a cement plant.	Late 1940's
Beazer East, Inc. (formerly Beazer Materials and Services, Inc.; formerly Koppers Company, Inc.) purchased the stock of the wood treating operating company.	1950's
Smith Valve Company purchased the property of the former operations (also operates a manufacturing plant on a separate parcel on the southwest side of Hocomonco Pond).	April 2, 1976
An open-jointed storm drain was installed crossing the site from Smith Valve Parkway to Hocomonco Pond.	1976
MA Division of Fisheries & Wildlife investigated two fish kills at Hocomonco Pond, attributed to creosote contamination.	November 1979 & April 1982
Studies and investigations were conducted to evaluate the source and extent of creosote contamination and evaluate methods to remove or contain the contamination (attributed to creosote and water leaking into the storm drain laid adjacent to the former lagoon and discharging to Hocomonco Pond).	1979-1982
Site proposed for listing on the National Priority List (NPL) due to the threat creosote contamination posed to the Otis Street municipal well and Hocomonco Pond.	Dec. 30, 1982
Excavation during reconstruction of Otis Street resulted in disturbance of contamination in the Kettle Pond area and redistribution of contaminated soil in the road embankment adjacent to the Kettle Pond area.	July 1983
Site was placed on the NPL.	Sept. 8, 1983
Information repositories were established at the Westborough Town Hall and Public Library.	January 1984
Remedial investigation / feasibility study (RI/FS) was issued.	September 1985
ROD was signed.	Sept. 30, 1985
Consent Decree entered into between EPA, the Commonwealth of Massachusetts, and the PRPs. Consent Decree entered by the U.S. District Court for the District of Massachusetts.	Jan. 10, 1988
Pre-design investigations conducted by the PRP.	1988-1992
Relocation of the storm drain (initially installed in 1976) was completed.	January 1990

TABLE 2-1 (cont.)
CHRONOLOGY OF SITE EVENTS
FIVE-YEAR REVIEW
HOCOMONCO POND SITE
WESTBOROUGH, MASSACHUSETTS

Event	Date
First Explanation of Significant Differences (ESD), changing the remedy for the Kettle Pond area, was issued by the EPA.	July 22, 1992
Supplemental Decision Document entitled “Cleanup Levels for Sediments, Soils and Groundwater and Limits of Excavation of Sediments and Soils” was issued by the EPA.	Sept. 28, 1992
Remedial design completed.	1993
Groundwater treatment plant constructed.	1993-1994
Excavation of the Kettle Pond area completed; construction of the on-site double-lined landfill for contaminated soil and sediments completed.	1994
Completed dredging of contaminated sediment from Hocomonco Pond and Brook and sealing and lining of Otis Street storm drain. DNAPL recovery begun.	1995
Soils from the former tank farm area and former storm drain excavated; covers on landfill and former lagoon completed.	1996
EPA issued a letter to the PRP indicating that remediating groundwater to drinking water quality may not be achievable at the entire site.	May 20, 1997
Technical Impracticability (TI) Work Plan submitted.	June 30, 1997
Field work was conducted to investigate the practicability of groundwater remediation.	Sept. – Nov. 1997
“Report Demonstrating the Technical Impracticability of Restoring Groundwater at the Hocomonco Pond Site” submitted by the PRP.	April 1998
EPA and MassDEP conducted a pre-final site inspection and determined construction activities were completed.	Sept. 10, 1999
Second ESD and associated TI waiver implemented.	Sept. 21, 1999
“Preliminary Close-Out Report” issued by EPA.	Sept. 22, 1999
“Interim Remedial Action Report” issued by EPA.	Sept. 28, 2000
“Revised Long-Term Monitoring Plan” (LTMP) submitted by the PRP.	September 2001
Baseline biological monitoring conducted, per the LTMP.	May 2002
“Long Term Monitoring Report” submitted by the PRP.	June 2002
Change to passive DNAPL recovery and groundwater treatment plant shutdown	May 2003
EPA agreed to allow passive DNAPL recovery to continue.	July 21, 2003

TABLE 2-1 (cont.)
CHRONOLOGY OF SITE EVENTS
FIVE-YEAR REVIEW
HOCOMONCO POND SITE
WESTBOROUGH, MASSACHUSETTS
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Event	Date
"Long Term Monitoring Report" submitted by the PRP.	July 30, 2004
First Five-Year Review completed.	Sept. 22, 2004
"Reuse Assessment for the Hocomonco Pond Superfund Site" issued by EPA	September 2004
"Final Long-Term Monitoring Report" submitted by the PRP	November 2005
Second Five-Year Review completed	September 2009

3.0 BACKGROUND

This section contains information pertaining to the site's physical characteristics, current and prior land use at the property, as well as waste identification and characterization information. This information has been obtained through a review of historical information, previous investigations, zoning and flood maps, and a site visit.

3.1 Physical Characteristics

The approximately 23-acre site is located in Worcester County, in the town of Westborough, Massachusetts (Figure 3-1). The site is bordered to the northwest by Hocomonco Pond, a 27-acre shallow freshwater pond, to the east by Otis Street, and to the south by the Smith Valve Parkway. The site lies approximately 3,500 feet south of Massachusetts Route 9.

The site is comprised of unconsolidated sediments, characterized as glacial drift deposits and tills, overlying consolidated bedrock (Fluor Daniel GTI, 1998). The glacial drift deposits vary in thickness, with the greatest thickness west of the Kettle Pond. Glacial drift deposits are absent in the southeast portion of the site. Till is found in most of the site, but is absent in western and southeastern areas. A sand and gravel layer exists within the till in areas where DNAPL is routinely found. The regional bedrock consists of Precambrian to Ordovician metamorphic rock, primarily schists, gneisses, and granites, which dips westward while striking northeast (EPA, 1985). A dominant geological feature of the site is a bedrock valley that extends from the northeast to the southwest, with the eastern wall sloping towards the west from the area near Kettle Pond (Fluor Daniel GTI, 1998). Based on geologic investigations conducted during the 1997 TI study, the "differential weathering and erosion of the bedrock surface" indicates that the bedrock valley appears to have been formed by a fault line (Fluor Daniel GTI, 1998).

The site is generally well-drained due to its topography and the relatively permeable soils, which overlie the sandy stratified drift deposits. Most of the site contains coarse-grained, poorly-sorted glacial drift deposits, which are comprised primarily of sand, silt, and gravel. These materials are underlain by dense clay and gravel till. Some locations, such as Kettle Pond and the surrounding area, contain permeable materials, increasing the potential for downward vertical migration of contaminants. Other areas, such as the area surrounding the former lagoon, are underlain by weathered bedrock/saprolite which prevents downward migration of contaminants (EPA, 1992a; Fluor Daniel GTI, 1998).

Groundwater flows northward towards Hocomonco Pond and discharges into the pond. In the extreme north of the site, data suggest that groundwater may be flowing northward following a general drainage pattern from Hocomonco Pond to more low-lying swamps northeast of Otis Street (BBL, 2002a). The hydrogeologic conditions present at the site indicate that Hocomonco Pond provides a constant head boundary, thus preventing any site contaminants from migrating toward the Otis Street municipal well, northwest of the pond, or toward the Smith Valve process well located west of the pond (EPA, 1985). Site contaminants were not found in either of these wells during the remedial investigation or during subsequent routine testing of the Otis Street well. There are no known potable wells within the impacted, or immediate downgradient, groundwater aquifer.

The Federal Emergency Management Agency flood insurance rate map for the area shows that Hocomonco Pond, its wetlands at both the inlet and discharge from the pond, and the wetlands east of Otis Street, lie within the 100-year floodplain (FIRM, 2002). The Kettle Pond wetland, located between Kettle Pond and Hocomonco Pond, is a 0.1-acre wooded swampy area that is occasionally inundated during major storm events. Hocomonco Pond discharges from its northeast end and flows under Otis Street into wetlands and the Assabet River (see Figure 3-1). The Assabet River wetland is a 70-acre wooded wetland located northeast of Hocomonco Pond (EPA, 1985). An unnamed 8-acre wetland, located northwest of Hocomonco Pond, is primarily wooded and is also contiguous to an inlet stream to the pond (see Figure 3-1).

3.2 Land and Resource Use

The current Town of Westborough zoning map shows the site and properties to the northwest of Hocomonco Pond as town-owned land. The Westborough Master Plan identifies the properties to the northwest as municipal protected and municipal unprotected open space (Daylor, 2003). The areas surrounding the site and the town-owned parcels northwest of the pond are zoned IB (General Industry). This zoning category allows for light industrial, office, and warehouse use (Daylor, 2003). Currently, and in the past, the surrounding lots were used for light industrial, commercial, and/or residential purposes. Although there are no private residences that directly border the site, there are approximately 40 residential homes within a ½ mile radius, most of which are located along Fisher Street, to the south. Access to the site property is restricted on three sides by a perimeter fence. While not completely enclosed, the fourth side of the site property directly abuts Hocomonco Pond, which itself is almost entirely restricted by a perimeter fence. Consequently, no evidence of trespassing has ever existed on the site property.

The site lies within a Zone II aquifer, which is a direct recharge area of a public water supply (Westborough, 2001). The Otis Street municipal well is located approximately 2,000 feet northwest and upgradient of Hocomonco Pond. The well is operated at a pumping rate that limits the radius of influence from intersecting Hocomonco Pond (EPA, 1985). Routine testing of the Otis Street well by the town has never detected any site contaminants (McNulty, 2004). According to town officials, a second municipal well planned for the Otis Street location was not installed due to concerns of the impact of two wells pumping in this area (McNulty, 2004). There are no water supply wells within the impacted portion of the aquifer.

There are no estimated habitats of rare wetland wildlife or priority habitats for state-listed rare species within one mile of the site. There are a number of potential vernal pools located in the Assabet River wetlands east of the site and Otis Street (Daylor, 2003).

EPA's September 2004 Draft Preliminary Reuse Assessment for Hocomonco Pond and the Westborough Master Plan include maps that show the major land uses, resources, and zoning discussed above.

Appendix D, "Summary of 2003 Open Space and Recreation Plan," of the Westborough Master Plan includes a plan to transfer the Hocomonco Pond site to the care and custody of the Conservation Commission when the cleanup is completed and the site is released to the town by EPA (Daylor, 2003). Town officials have indicated plans for passive recreational use of the site and noted during the site inspection that a walking trail proposed for along the Smith Valve Parkway, south of the site, was constructed in 2004.

3.3 History of Contamination

Wood treating operations were conducted on-site between 1928 and 1946. These activities consisted of saturating wood products with creosote to preserve them (EPA, 1985). Waste produced during these operations was discharged into the 1.7 acre unlined (former) lagoon,

located south of Hocomonco Pond. When the lagoon was filled with waste creosote, sludge, and water, its contents were pumped into two depressed areas, approximately 1 acre in size, referred to as the Kettle Pond area. The Kettle Pond area was located east of the operations and near the west side of Otis Street (EPA, 1985). Public information indicates that creosote was not used or stored on the site after March 26, 1946 (EPA, 1985).
After 1946, the facility was converted to an asphalt mixing plant. Aggregate and asphalt wastes associated with this operation were discarded on the site. The facility was later converted into a cement plant where dry cement was sold in bulk (EPA, 1985).

An open-jointed storm drainage system was installed in 1976 per order of the Westborough Conservation Commission to collect runoff from Smith Valve Parkway and contain a small watercourse that crossed the site. Unknowingly, the storm drain was constructed adjacent to the east side of the former lagoon. Rainwater passing through the drainage system transported contaminants from the former lagoon into Hocomonco Pond and a portion of its discharge stream. Between 1979 and the mid 1980s an oil boom was placed in Hocomonco Pond at the drain channel discharge during heavy rains. The boom was used to collect creosote that discharged to the pond (EPA, 1985). The Massachusetts Division of Fish and Wildlife investigated two fish kills, in 1979 and 1982. The fish kills were attributed to creosote leaching from the former lagoon into the storm drain and discharging into and contaminating the pond.

Road reconstruction on Otis Street in 1983 adjacent to Kettle Pond unearthed contaminated soil, which was then redistributed along the roadway embankments (EPA, 1985). Given the historical operations in the area, EPA collected water, soil, and sludge samples along the Otis Street construction area for risk assessment purposes. Contaminants detected in the sludge samples were consistent with creosote and its by-products.

3.4 <u>Initial Response</u>

In the early 1980s Hocomonco Pond was closed for recreational uses, and signs were posted prohibiting fishing, boating, and swimming (EPA, 1985). Access to the site was restricted by placement of large boulders across the access road. Based on the extent of creosote contamination detected in the Hocomonco Pond area and the potential threat of contamination to the Otis Street municipal well, EPA evaluated the site and proposed it for inclusion on the

National Priority List (NPL) in 1982. The site was officially placed on the NPL on September 8, 1983 (EPA, 1992). A remedial investigation (RI) was initiated in 1984.

3.5 Basis for Taking Action

The RI identified four primary areas of contamination on the site: (1) the Kettle Pond area; (2) Hocomonco Pond and its discharge stream; (3) the former lagoon area; and (4) Otis Street. In addition, the RI identified three small isolated areas: contaminated soil near MW-1; tank bases adjacent to the former lagoon; and sediments in the southwest drainage channel. The predominant contaminants found in all of these areas of contamination were creosote compounds, primarily polycyclic aromatic hydrocarbons (PAHs) such as acenaphthene, naphthalene, acenaphthylene, fluorene, phenanthrene, dibenzofuran, and 2-methylnaphthalene (EPA, 1985). The extent of the contamination identified in each of these areas is shown on Figure 3-2. A brief description of each of the areas of contamination identified in the RI is provided below, followed by a summary of the endangerment assessment that was performed to address public health and environmental concerns at the site.

3.5.1 Kettle Pond Area

Creosote contamination was detected in soils at concentrations up to 483 mg/kg at a depth of 0 to 2 feet; a concentration of up to 55 mg/kg was detected at a depth of 20 feet below ground surface (bgs). The contamination extended below the water table, which was located at approximately 8 feet bgs, and was visible in soil borings to a depth of 17 feet bgs (EPA, 1992a). The RI estimated the volume of contaminated soil to be approximately 24,000 cubic yards with an aerial extent of approximately one acre (EPA, 1992a). Contamination extended to the western bank of Otis Street and north to Hocomonco Pond (EPA, 1985). Downgradient of Kettle Pond, groundwater was contaminated with creosote compounds and phenolic compounds at parts per million concentrations. Iron and manganese were detected at concentrations which exceeded secondary drinking water standards (EPA, 1985). Surface soil adjacent to Hocomonco Pond also contained creosote compounds (EPA, 1992a).

3.5.2 Hocomonco Pond and Discharge Stream

The RI determined that creosote-contaminated leachate migrated from the former lagoon into the open-jointed storm drain adjacent to the former lagoon, and discharged into Hocomonco Pond (EPA, 1992a). The creosote compounds contaminated the sediments in the discharge stream and along the shoreline of the pond. Most of the metals detected exceeded background levels in both pond and stream sediments. Migration via the storm drain was noted as the primary source of contamination in Hocomonco Pond and the discharge stream. Contaminated surface water was found in the pond only within the oil boom area at the storm drain discharge. Contamination was not found in surface water beyond the oil boom or in the discharge stream exiting the pond near Otis Street (EPA, 1985).

3.5.3 Former Lagoon Area

Creosote contamination was detected in the soil near the surface and at depths ranging from 5 to 20 feet bgs. Creosote product was observed in the upper 15 feet of the soil, above the groundwater table (EPA, 1985). The RI estimated the volume of contaminated soil in the former lagoon area to be approximately 18,000 cubic yards with an estimated aerial extent of approximately 1.7 acres (EPA, 1992a). Groundwater contamination was not found in wells located downgradient of the former lagoon. Observations made during test pit and soil boring operations suggested that downward migration of contaminants was apparently impeded by impervious layers of sludge and fines in the bottom of the lagoon. The RI concluded that hydrogeologic conditions in the area would prevent migration of contaminants deep into the aquifer and that seepage from the lagoon into the groundwater would likely flow laterally and discharge into Hocomonco Pond (EPA, 1985).

3.5.4 Otis Street

Creosote contamination was not detected in soils or groundwater along the eastern embankment of Otis Street; metals above background levels were found in both soil and groundwater. Manganese was the only compound detected in the groundwater east of Otis Street that exceeded secondary drinking water standards (EPA, 1985). Stream sediments containing creosote contamination were detected 300 feet downstream of Otis Street (see Section 3.5.2).

3.5.5 Isolated Areas

The RI reported that limited creosote contamination was found in the three isolated areas. Shallow soils near MW-1 contained creosote contamination ranging from 2.5 to 9 mg/kg (EPA, 1985). Creosote contaminants were detected in sediments in the southwest drainage channel at concentrations ranging from 6 to 39 mg/kg (EPA, 1985) (see Figure 3-2). Oily creosote compounds were found in the bottom of the tank bases (Golden, 2004).

3.5.6 Endangerment Assessment

The ROD summarized the endangerment assessment that was performed to address public health and environmental concerns at the site. The assessment included hazard identification, exposure assessment, and risk characterization. Critical contaminants were identified based on the data collected during the RI from each of the areas of contamination described above in Sections 3.5.1 to 3.5.5. The list of chemicals that pose the greatest potential health risk is based on potential cancer risks and non-cancer health hazards. It also includes several PAHs for which toxicity values were not available. This list of critical contaminants for the site is shown in Table 3-1.

Critical contaminants were found in high concentrations in soil and sediments in the former lagoon area, Kettle Pond area, and Hocomonco Pond and its discharge stream. Lower concentrations were found in groundwater in the Kettle Pond and Otis Street areas and in surface water within the oil boom at the storm drain discharge to Hocomonco Pond. The exposure assessment identified inhalation, ingestion, and direct contact as potential routes of exposure. Risks were calculated based on exposures to the identified critical contaminants via ingestion and dermal contact (EPA, 1985).

TABLE 3-1
CRITICAL CONTAMINANTS
FIVE-YEAR REVIEW
HOCOMONCO POND SITE
WESTBOROUGH, MASSACHUSETTS

ORGANICS	
Carcinogens	Benzo(a)pyrene
	Benzene
Non-carcinogens	Naphthalene
	Fluoranthene
Unknowns	Phenanthrene
	Anthracene
	2-methylnaphthalene
	Pyrene
	Fluorene
	Acenaphthene
	Benzo(a)anthracene
	Chrysene
	Dibenzofuran
	2-chlorophenol
	4-methylphenol
	2,4-dimethylphenol
	2-methylphenol
	Benzo(g,h,i)pyrene
INORGANICS	
Carcinogens	Arsenic
	Chromium

Source: EPA, 1985

4.0 REMEDIAL ACTION

This section describes the remedial actions selected for and implemented at the site in accordance with the ROD and the modifications to the ROD.

4.1 Remedy Selection

The September 30, 1985 ROD specified a multi-component remedy to address each of the areas of contamination at the site. Based on the conclusions of the RI, remedial action objectives (RAOs) were identified that would mitigate or eliminate impacts to human health and the environment due to exposure to site contaminants. The individual RAOs described in the ROD for each area of contamination are summarized in the table below.

Remedial Action Objectives (per ROD)	Areas of Contamination				
	Former Lagoon	Kettle Pond	Hocomonco Pond & Discharge Stream	Otis Street	Isolated Areas
Eliminate inhalation, direct contact and/or ingestion exposure pathways	X	X	X	X	X
Eliminate the contaminant migration potential to downstream areas and to surface waters	X		X	X	X
Ensure no future groundwater contamination	X				
Eliminate impacts on wetlands	X	X		X	X
Eliminate groundwater contamination in this area and east of Otis Street		X			
Eliminate future potential impacts to wetlands and fisheries (e.g. the ingestion exposure pathway)			X		
Enhance future recreational usage of Hocomonco Pond			X		

Source: EPA, 1985

Since remedial alternatives for each area were evaluated separately, the ROD selected separate remedial actions that addressed the specific issues identified for each area. The remedial alternatives selected by the EPA needed to ensure that "the best practical measures were used and the most cost effective alternatives that are technologically feasible and reliable were chosen to effectively mitigate potential harm and provide adequate protection for public health, welfare, and the environment" (EPA, 1985). Therefore as part of the ROD, the EPA issued a separate Statement of Findings for each of the four primary areas to ensure compliance with EPA policy, Executive Orders 11988 (Floodplains Management) and 11990 (Protection of Wetlands), and consistency with Massachusetts state law and local standards. The Statements of Findings were required since some of the proposed remedial actions were in or might potentially affect a 100-year floodplain and/or a wetland. The remedies selected for each area of contamination are briefly described below.

Kettle Pond Area. The remedy selected for the Kettle Pond area involved excavation of contaminated soil/waste and on-site disposal into a double-lined landfill. The remedy also included dewatering Kettle Pond to lower the groundwater level prior to and during excavation. A groundwater pumping and treatment system would be installed to lower the groundwater level and also to extract and treat contaminated groundwater (EPA, 1985). This alternative was selected since it would remove the soil/waste source of contamination to groundwater. This would be achieved by excavating all visible contamination and approximately 2 to 3 feet of additional soil below the visible contamination and consolidating it into an on-site double-lined landfill (EPA, 1985).

Hocomonco Pond and Discharge Stream. The remedy selected for Hocomonco Pond and its discharge stream involved mechanical dredging of contaminated sediments with on-site disposal either into the former lagoon area prior to construction of the cap and/or at an approved landfill facility. This alternative was selected since it would remove the contamination and essentially restore Hocomonco Pond to a condition suitable for recreational purposes (EPA, 1985).

Former Lagoon Area. The remedy selected for the former lagoon area involved site grading, construction of a cap, removal/disposal of the storm drain pipe that had been installed along the eastern side of the former lagoon, and installation of a new storm drain pipe outside of the former lagoon limits. This alternative was selected since all soil contamination was located above the water table; therefore containment of the waste material under the cap would prevent migration to Hocomonco Pond and groundwater (EPA, 1985). A deed restriction was also required for the area of the cap to prevent future development (EPA, 1985).

Otis Street. The remedy selected for Otis Street involved sealing the open-jointed storm drainage pipe along the east side of the street. This alternative was selected since it would prevent the migration of contamination from the drainage pipe into Hocomonco Pond, the discharge stream, and adjacent wetlands. A deed restriction would be required for the road embankment area (EPA, 1985).

Isolated Areas. The remedy selected involved removal of the tank bases, contaminated soil near MW-1, and contaminated sediment from the southwest storm drain channel, and consolidation of the materials either on-site into the former lagoon area prior to construction of the cap and/or at an approved landfill facility. This option was selected to eliminate the potential exposure risk to humans and animals from contaminants in these isolated areas (EPA, 1985).

On January 10, 1988, a Consent Decree was entered into between the EPA, the Commonwealth of Massachusetts, and the following parties: Beazer East, Inc. (Beazer), Chicago Bridge & Iron Co., Smith Valve Corp., Massachusetts Department of Public Works (DPW), and the Town of Westborough (EPA, 1992a). The Consent Decree set forth activities that Beazer would be required to carry out in order to implement the remedies specified in the ROD. The other PRPs agreed to make settlement payments to Beazer (EPA, 1992a). These activities, specified in the Remedial Design/Action Plan (RD/RA Plan), attached as Appendix I to the Consent Decree, included pre-design, remedial design, remedial action, and long term operation and maintenance (O&M) for the remedies selected in the ROD.

As part of the selected remedy for the former lagoon area, the storm drain along the east side of the lagoon area was relocated between November 1989 and January 1990. The contaminated portions of the former storm drain were then excavated as part of the activities described in Section 4.3.1.

4.2 Additional Investigations

Along with the remedial alternatives selected for each area of contamination, the ROD listed future actions to support the design process and on-going monitoring. These actions included:

- Soil sampling and analysis during the design process to determine the extent of excavation required at the Kettle Pond area, the former tank farm, the southwest storm drain area, and the MW-1 area;

- A sediment investigation during the design process to determine the extent of dredging that would be required to remediate Hocomonco Pond;

- Water treatability studies for the Kettle Pond area, as necessary, to adequately design a water treatment system for dewatering the area prior to excavation;

- Monitoring of the former lagoon area cap and double-lined landfill to ensure their effectiveness;

- Establishing final groundwater cleanup levels after soil and groundwater remedial actions were completed in the Kettle Pond area; and

- Installing fencing during design and prior to the start of construction activities to prevent direct exposure of the public to contaminants and to the construction activities on the site (EPA, 1985).

4.2.1 Pre-Design Investigations

The PRP conducted pre-design investigations in the early 1990s, including sediment, soil, groundwater, and fish tissue sampling, to further refine the extent of contamination in the different areas of the site. During the remedial design, the results of these sampling activities were used to supplement the previous investigations of the site to define the extent of excavation and dredging activities that would be required in each area.

Sediment sampling was conducted at Hocomonco Pond, the discharge stream, and a marshy area and abandoned stream associated with Hocomonco Pond. Soil sampling was conducted at the former wood treating building located to the north of the former lagoon, at the former tank farm area, in the southwest storm drain, around MW-1, Kettle Pond, and the area between Kettle and Hocomonco Ponds. Groundwater sampling was conducted across the site to confirm the location of the bedrock valley and determine the migration path for the creosote contamination. Five fish tissue samples were collected from Hocomonco Pond (EPA, 1992a).

4.2.2 1992 Explanation of Significant Differences

The PRP also conducted additional investigations at Kettle Pond as part of the pre-design activities specified in the Consent Decree. These investigations resulted in new information which questioned the effectiveness and implementability of the remedy specified in the ROD for the Kettle Pond area.

During pre-design investigations in the Kettle Pond area, boulders were encountered in the glacial drift during drilling activities. The investigation also determined that the aquifer in the Kettle Pond area was more transmissive than estimated in the RI. The sheet piling would need to be installed to a depth of 60 to 80 feet to control groundwater inflow from the deep permeable aquifer. The PRP determined that the boulders and overhead utility wires would impede the installation of sheet piles, as required in the ROD to support the excavation sidewalls and prevent water from entering the excavation, since the sheeting could bend and separate and therefore compromise the hydraulic and structural integrity of the remedy (EPA, 1992a).

The investigations also determined that the vertical extent of visible contamination extended to a depth of approximately 45 feet bgs into the saturated soils, rather than 20 feet bgs as reported in the RI. The investigations concluded that lowering the groundwater level in the Kettle Pond to facilitate "dry" excavation, as specified in the ROD, could cause subsidence of Otis Street, a heavily traveled road (EPA, 1992a).

A deep overburden and shallow bedrock investigation was conducted to investigate the December 1988 discovery of creosote product in deeper soils west of Kettle Pond. During this investigation, creosote was observed as a dense non-aqueous phase liquid (DNAPL) at a depth of approximately 140 feet bgs west of Kettle Pond (EPA, 1992a; EPA, 1992b). The DNAPL was found above dense clay soil and/or weathered bedrock, which appeared to have acted as a barrier to further downward migration (EPA, 1992a).

In response to this new information, on July 22, 1992, the EPA issued the first Explanation of Significant Differences (ESD) for the site which modified the remedy originally selected for the Kettle Pond area. The remedies selected for the other areas of the site were not modified, as they were not impacted by the new information. To ensure that the Kettle Pond remedy remained protective of human health, welfare, and the environment, the 1992 ESD set forth the following changes:

- The ROD requirement for sheet piling and the dry excavation of sediments and soils was replaced with a requirement for wet excavation of shallow contaminated material to a maximum depth of 5 feet;

- The ROD requirement for excavating, dewatering, and landfilling the deeper contaminated soil was replaced with a requirement for in-situ bioremediation and soil flushing; and

- Since DNAPL in the deep overburden can be a continuous source of dissolved contaminants, the ESD required product recovery prior to and/or during in-situ bioremediation and either on- or off-site treatment or product reuse offsite.

The EPA concluded that "these changes do not fundamentally alter the remedy selected in the ROD" (EPA, 1992a).

4.2.3 Cleanup Levels and Limits of Excavation

The Consent Decree and RD/RA Plan included a requirement that EPA would establish the horizontal and vertical limits of excavation in the Kettle Pond area, Hocomonco Pond, and its discharge stream in a supplemental decision document. On September 28, 1992, EPA issued a final supplemental decision document (SDD) entitled "Cleanup Levels for Sediments, Soils and Groundwater and Limits of Excavation of Sediments and Soil." The document established the vertical and horizontal extent of excavation for the site and also established cleanup levels for soils, sediments, and groundwater across the site (EPA, 1992a). Based on the pre-design investigation results, and other studies, EPA identified contaminants of concern (COCs) for the site. The COCs identified included benzene, toluene, ethylbenzene, and xylenes (BTEX), noncarcinogenic and carcinogenic PAHs, arsenic, and chromium (EPA, 1992a).

The groundwater cleanup levels established by EPA in the SDD are the Maximum Concentration Limits (MCLs) and non-zero MCL goals (MCLGs) for the COCs. However, since MCLs had not been established for non-carcinogenic PAHs and some carcinogenic PAHs (cPAHs), risk-based criteria were used to establish interim groundwater cleanup levels. The interim cleanup levels and the criteria upon which they were based, are shown in Table 4-1.

TABLE 4-1
INTERIM GROUNDWATER CLEANUP LEVELS
FIVE-YEAR REVIEW
HOCOMONCO POND SITE
WESTBOROUGH, MASSACHUSETTS

Constituent	**Interim Cleanup Level (μg/l)**	**Reference (criteria)**
PAH – carcinogenic		
Benzo(a)anthracene	None	-
Benzo(a)pyrene	0.2	final MCL
Benzo(b)fluoranthene	None	-
Benzo(k)fluoranthene	None	-
Chrysene	None	-
Dibenzo(a,h)anthracene	None	-
Indeno(1,2,3-cd)pyrene	None	-
PAH – noncarcinogenic		
Acenaphthene	2,200	risk-based
Acenaphthylene	None	-
Anthracene	11,000	risk-based
Benzo(g,h,i)perylene	None	-
Fluoranthene	1,500	risk-based
Fluorene	1,500	risk-based
Naphthalene	1,500	risk-based
Phenanthrene	None	-
Pyrene	1,100	risk-based
VOCs		
Benzene	5	final MCL
Ethylbenzene	700	final MCLG
Toluene	1,000	final MCLG
Xylenes (total)	10,000	final MCLG
Inorganics		
Arsenic	50	final MCL
Chromium (total)	100	final MCLG

None = no interim cleanup level established
Source: EPA, 1992b

The SDD stated that these interim levels, which were applied to groundwater within the saturated zone beneath the entire site, could be reassessed during implementation of the remedy and at the completion of the remedial action to ensure its protectiveness. The SDD allowed for periodic assessments and a possible re-evaluation of performance standards associated with the groundwater treatment remedy. The SDD required a risk assessment to evaluate the potential risk of consumption of site groundwater once the groundwater ARARs were achieved (EPA, 1992b). Note that the arsenic MCL has been lowered to 10 ug/l in the *time since the SDD was published.*

Based on the soil and sediment data collected during the pre-design investigations, EPA established cleanup standards for Hocomonco Pond, the discharge stream, Kettle Pond area, and the isolated areas. Cleanup levels were established based on risks to human health from potential exposure via dermal contact and ingestion as well as risks to aquatic life. No cleanup levels were established for surface water or fish since the risks calculated were less than 10^{-6} (EPA, 1992b). The volumes of sediment and soil in each area that exceeded the respective cleanup standard, and thus required excavation, were then estimated by EPA. The soil and sediment cleanup standards and estimated volumes are summarized below for each area.

<u>Kettle Pond Area.</u> A human health based cleanup level of 4 mg/kg cPAHs was established for surface soils (less than 2 feet) in the Kettle Pond area. To meet this standard, EPA determined that removal of the top 4 feet of soil, totaling approximately 4,200 cubic yards, was required (EPA, 1992b). Excavating this volume of soil would result in the removal of a considerable volume of contaminated material before the in-situ bioremediation activities were implemented.

<u>Hocomonco Pond.</u> A human health based cleanup level of 4 mg/kg cPAHs was established for shallow sediments in Hocomonco Pond. In the shallow sediment of the eastern portion of the pond, a cleanup level of 35 mg/kg total PAHs and 4 mg/kg phenanthrene was established for protection of aquatic life (EPA, 1992b). EPA determined that dredging pond sediments along approximately 4,000 feet of shoreline at depths ranging from 0.5 to 1.5 feet bgs was required to meet the cleanup standard. The total volume of sediments required to be removed was approximately 1,840 cubic yards (EPA, 1992b).

Discharge Stream. A human health based cleanup level of 7 mg/kg cPAHs was established for the contaminated sediment in the upper portion of the stream, from Otis Street east approximately 440 feet. A cleanup level of 35 mg/kg total PAHs and 4 mg/kg for phenanthrene, in shallow sediments for the entire stream and adjacent soils, was established for the protection of aquatic life (EPA, 1992b). EPA determined that excavation of approximately 500 cubic yards of sediments in the upper portion of the discharge stream was required. Excavation of approximately 50 cubic yards of contaminated sediment in the lower portion of the discharge stream was also required (EPA, 1992b).

Isolated Areas. The human health based cleanup level for soils in the former tank farm area, southwest storm drain, and around MW-1 was 4 mg/kg cPAHs (EPA, 1992b). Since the tank base and the soil adjacent to the tank base were contaminated, EPA determined that excavation of approximately 940 cubic yards of soil to a depth of 2 feet bgs was required. Approximately 730 cubic yards was required to be excavated near MW-1 (EPA, 1992b).

4.3 Remedy Implementation

This section describes the completion of the tasks required to implement the remedies for each area of contamination on the site in accordance with the ROD, 1992 ESD, and SDD. At the time the ROD was issued, the site was not fenced and pedestrian access was not restricted. Fencing was installed around the areas of contamination by the PRP prior to implementation of the remedial action. Implementation of the remedies began in 1994 as described in Sections 4.3.1 through 4.3.6 below. By 1996 all soil and sediment remedial activities had been completed on the site. Certification reports were submitted in 1997, documenting that the excavation and dredging activities, and the construction of the on-site double-lined landfill, former lagoon area cap, water treatment plant, and in-situ bioremediation system, were completed in accordance with EPA-approved plans.

4.3.1 Dredging and Excavation Activities

Dredging and excavation of soils and sediments from the various areas of contamination on the site were conducted between 1994 and 1996. These activities are described below based on the portions of the certification reports attached to EPA's Interim Remedial Action Report

(EPA, 2000). The approximate extent of the dredging and excavation activities is shown on Figure 4-1.

Kettle Pond Area. Excavation activities were conducted in and around Kettle Pond from October to November 1994. A total of approximately 4,500 cubic yards of sediments and soils were removed from an area within the 286-foot contour line of Kettle Pond and to the east of Kettle Pond. Confirmatory samples collected outside this footprint indicated that soils and sediments did not exceed the cleanup levels. Due to the lack of contamination along the western perimeter, and with the concurrence of EPA, the limits of excavation were reduced to minimize disturbance to the environment. Once excavation was completed, saturated sediments were de-watered in drying beds (temporary lined structures located in the area of the former lagoon) and then placed into the on-site double-lined landfill. The water collected during dewatering the Kettle Pond excavation was pumped to the drying beds and then to the on-site water treatment plant (Fluor Daniel GTI, 1997).

Hocomonco Pond. Dredging activities at Hocomonco Pond occurred from September through December 1994 and June through November 1995. Six inches of sediment were dredged from an approximately 20-foot wide area along the shoreline from the pond discharge point at the Otis Street culvert west to the former boat ramp. Approximately 2,300 cubic yards of sediment were dredged from this area. Prior to disposal into the on-site double-lined landfill, the saturated sediments were dewatered in the drying beds. Water collected in the drying beds was then treated at the on-site water treatment plant. Additional excavation was required where post-remedial sediment samples exceeded the cleanup standards. All excavated areas were then backfilled with clean material (Fluor Daniel GTI, 1997).

Discharge Stream. Sediments were excavated from the discharge stream located downstream from Hocomonco Pond and the culvert beneath Otis Street, and along a small unnamed tributary located south of the discharge stream. The excavation activities took place in May 1995. Following excavation of approximately 500 cubic yards of sediments, the stream and tributary were backfilled to the approximate original grade. Prior to disposal into the on-site double-lined landfill saturated sediments were dewatered in the drying beds. (Fluor Daniel GTI, 1997).

Former Storm Drain. The storm drain was relocated and the new storm drain was constructed in January 1990. At that time the former storm drain located on the eastern side of the former lagoon was left in place. Excavation and removal of the former storm drain was completed in August 1996. Approximately 1,400 cubic yards of soils and reinforced concrete pipe were excavated and visually segregated. Stained and saturated materials, totaling approximately 140 cubic yards, were directly transferred to the on-site double-lined landfill. The remaining 1,260 cubic yards were used as unclassified fill for the cap of the former lagoon area. The excavated area was then backfilled with clean low permeability off-site soils. (Fluor Daniel GTI, 1997).

Tank Farm Area. From August to September 1996 approximately 2,700 cubic yards of soil were excavated from the area extending from the tank farm to the adjacent site chain-link fence line. Of the 2,700 cubic yards excavated, approximately 300 cubic yards were used as unclassified fill in the on-site double-lined landfill while the remaining 2,400 cubic yards were used as unclassified fill under the former lagoon area cap. Tank bottoms and bases were excavated, cut up, and incorporated into the unclassified fill placed in the on-site landfill. The sludge that was encountered was solidified and also used as unclassified fill in the on-site landfill. (Fluor Daniel GTI, 1997).

4.3.2 Landfill Construction

The on-site landfill, located midway between the former lagoon area and the water treatment plant (see Figure 4-1), was constructed between June and July 1994. The double-lined landfill cell, approximately 160 feet long and 160 feet wide, was designed to meet the ROD-specified technical standards of the Resource Conservation and Recovery Act (RCRA). The landfill was designed as a containment area for contaminated soils and sediments that were excavated from the various areas of contamination across the site (see Section 4.3.1). Approximately 8,500 cubic yards of fill, the majority from the excavated areas of the site, were placed into the double-lined landfill cell (Fluor Daniel GTI, 1997).

A leachate collection system consisting of a submersible pump with automatic sensing controls and associated piping was constructed at the southern side of the landfill due to its proximity to the water treatment plant. The leachate system piping extended from the pump at the base of the landfill to the treatment plant, where the collected leachate was treated (Fluor Daniel GTI, 1997). All construction activities, including installation and testing of the liners and leachate collection system, placement of the soils and dewatered sediments excavated from the various areas of the site, and construction of the landfill cap followed the EPA-approved design specifications and construction quality assurance plan. The landfill cap was seeded and mulched in November 1996 (Fluor Daniel GTI, 1997).

Four groundwater monitoring wells (LF-1 through LF-4) were installed around the perimeter of the landfill cell in June 1993 to assess the effectiveness of the double-lined landfill. Monitoring well LF-1 was installed south of the landfill to assess groundwater quality upgradient of the landfill, while monitoring wells LF-2 through LF-4 were installed north, or downgradient, of the landfill (Fluor Daniel GTI, 1997). Following semi-annual baseline sampling of the wells in 1993 and 1994, the monitoring frequency was reduced to an annual event. The results of the annual monitoring events are discussed in Section 6.4.1.

4.3.3 Former Lagoon Area Cap Construction

The former lagoon area, located southeast of Hocomonco Pond and west of the landfill (see Figure 4-1), was capped in October 1996. Temporary drying beds had been constructed at this location for dewatering the saturated dredged and excavated sediments from the contaminated areas on the site (see Section 4.3.1). Approximately 3,660 cubic yards of unclassified fill, obtained from the former storm drain and tank farm excavations, was placed in the former lagoon area. In addition, approximately 1,200 cubic yards of unclassified fill was imported from two off-site borrow sources to achieve the minimum elevations required by the design specifications. (Fluor Daniel GTI, 1997a).

During excavation of a portion of the anchor trench for the cap liner system a concrete structure, thought to be a retaining wall, was encountered. Due to its size, the concrete was left in place and the cap was extended to include this subsurface structure. All construction activities, including installation and testing of the liner, placement of the fill materials, and construction of the geomembrane cap, followed the EPA-approved design specifications and construction quality assurance plan (Fluor Daniel GTI, 1997a). Once all the required cover materials were in place, 6 inches of stone was placed around the perimeter slopes of the cap to prevent erosion. Seeding and mulching of the cover and associated drainage channels of the former lagoon occurred in November 1996, concurrent with the seeding of the landfill cap (Fluor Daniel GTI, 1997a).

Four groundwater monitoring wells (MLC-1 through MLC-4) were installed in June 1993 to establish baseline conditions prior to installation of the cap on the former lagoon area. Monitoring well MLC-1 was installed south, hydraulically upgradient, of the former lagoon, while MLC-2, MLC-3, and MLC-4 were installed north, or downgradient, of the lagoon (Fluor Daniel GTI, 1997a). Following semi-annual baseline sampling of the wells in 1993 and 1994, the monitoring frequency was reduced to an annual event. The results of the annual monitoring event are discussed in Section 6.4.1.

In addition, six of the monitoring wells installed during previous investigations (TRC-6S, TRC-6D, TRC-7S, TRC-7D, TRC-B1, and TRC-C2) were abandoned according to MassDEP guidelines in order to construct the cap (Fluor Daniel GTI, 1997a).

4.3.4 Storm Drain Sealing

The storm drain located along Otis Street (see Figure 4-1) was cleaned and inspected in November 1994. A total of 1,032 linear feet of storm drain was inspected and cleaned, as were manholes and catch basins located along Otis Street. During this operation approximately 10,000 gallons of water were generated and approximately 1.5 cubic yards of debris were collected. The water and debris were initially pumped to the drying beds; after dewatering, the debris was then placed in the double-lined landfill and the water was treated in the treatment plant. No cracks or structural deficiencies were detected during the inspection of the storm drain. In September 1995, joints in the storm drain were sealed and two manholes and four catch basins were grouted (Fluor Daniel GTI, 1997b).

The Otis Street culvert is approximately 113 feet long and 3.5 feet in diameter and drains from Hocomonco Pond. The culvert was cleaned in September 1996. Approximately 4 cubic yards of sediments were excavated and placed as unclassified fill beneath the former lagoon cap. Approximately 5,800 gallons of water generated during the cleaning were transferred to the water treatment plant (Fluor Daniel GTI, 1997b).

4.3.5 Construction of the Water Treatment Plant

The water treatment plant was designed to treat groundwater containing dissolved and suspended oils and solids to achieve the interim cleanup levels established in the SDD. The design of the water treatment plant was integrated with the DNAPL recovery system and in-situ bioremediation system described in Section 4.3.6 below. No specific discharge limits were set for PAHs and BTEX, identified as "constituents of interest" in the Consent Decree. The plant thus was designed to meet EPA "Gold Book" effluent discharge criteria shown in the table below and also to pass the acute toxicity screening test (Orbital, 1997).

"GOLD BOOK" CRITERIA		
Compound	**Maximum Concentration (µg/l)**	**Continuous Concentration (µg/l)**
Arsenic	360	190
Chromium III	1700	210
Chromium VI	16	11

Source: Orbital, 1997

The water treatment plant was constructed between November 1993 and July 1994 to treat groundwater containing dissolved and suspended oil and/or solids pumped from several recovery wells located on-site, as well as the water collected in the drying beds during dewatering of excavations and saturated sediments. The plant was located off the site access road from Otis Street and approximately 350 feet southeast of the eastern perimeter of Hocomonco Pond (see Figure 4-1). The plant was designed to operate at a total flow of about 150 gallons per minute (gpm); approximately 135 gpm would be from groundwater, while 15 gpm would be from other sources. Startup of the plant began on August 9, 1994 (Orbital, 1997).

The main unit processes in the treatment plant include pH adjustment, polymer addition, dissolved air flotation (DAF), multimedia filtration, and carbon adsorption. The treated water was discharged to Hocomonco Pond, recycled, or diverted to the in-situ bioremediation system where nutrients and oxygen were added and the water injected into the aquifer to enhance bioremediation. Treated effluent was discharged to Hocomonco Pond via an outfall located in the vicinity of sediment station SED-2 (see Figure 4-2) (Bollinger, 2004a). The solids were skimmed off the DAF unit. The heavier solids removed from the DAF unit were stored outside the plant until they were ultimately disposed of off site (Orbital, 1997).

Effluent monitoring was performed during start up and normal plant operations. The certification report documenting that construction and operation of the plant were completed in substantial conformance with the design documents also confirmed that the discharge from the plant was in compliance with the "Gold Book" criteria during start up and normal operation (Orbital, 1997).

4.3.6 DNAPL Recovery/In-Situ Bioremediation

The primary objectives of the groundwater pump and treat system were to remove DNAPL from a series of DNAPL recovery wells and treat the associated contaminated groundwater; and to recover and treat contaminated groundwater from Kettle Pond, add nutrients to enhance bioremediation, and then reinject the treated water through a series of reinjection wells. The DNAPL recovery wells and bioremediation recovery and reinjection wells were installed concurrent with construction of the water treatment plant. The recovery wells were piped to a DNAPL storage tank located behind the water treatment plant. The four DNAPL recovery wells (DRW-1 through DRW-3, A-10) were fitted with automatic groundwater and DNAPL pumps (BBL, 2003a). The five biological recovery wells (BRW-1 through BRW-5) installed in the Kettle Pond area as part of the in-situ bioremediation system were fitted with manually-operated DNAPL recovery pumps (BBL, 2003a). These wells are shown on Figure 4-2.

The in-situ bioremediation system began operation on March 4, 1996. Operation of the system was suspended on March 18, 1996 due to problems with dissolved, naturally-occurring iron in the groundwater. The 1992 ESD stated that if the combination of DNAPL recovery and in-situ bioremediation could not remediate the creosote contamination "to cleanup goals within a reasonable time period as determined by EPA, then other technologies, such as in-situ soil flushing, will be implemented" (EPA, 1992a). Following additional groundwater sampling in the Kettle Pond area, two other treatment alternatives, air sparging and natural attenuation, were evaluated. The evaluation concluded that the effectiveness of both technologies was limited due to the presence of residual and free phase DNAPL (Fluor Daniel GTI, 1998). Based on experience with other sites contaminated with creosote at DNAPL concentrations, EPA then recommended that a technical impracticability demonstration be completed for certain areas of the site (see Section 4.3.7). The BRW wells continue to be checked for the presence of

DNAPL. DNAPL is regularly found only in BRW-5; when present the pump is manually activated to remove the accumulated DNAPL.

The DNAPL recovery wells were operated in an enhanced/passive mode beginning in March 1995. After 2 years of adjustments to the timing and pumping rates, the system was set to run at 10 gpm at DRW-1 and 5 gpm at DRW-2 over a 6-week cycle as described below (BBL, 2003). During each 6-week cycle, two wells, DRW-1 and DRW-2, were operated in an enhanced mode for 4 weeks and passive mode for 2 weeks. Wells DRW-3 and A-10 were operated in a continuous passive mode. During operation in the passive mode, the DNAPL pumps were set to automatically switch on and remove DNAPL at the rate that it enters each well. In the enhanced mode, both the groundwater and the DNAPL pumps were active; groundwater was pumped to create a hydraulic gradient toward the wells, increasing the rate that the DNAPL enters the well, thus increasing the volume of DNAPL recovered (BBL, 2003). The DNAPL is collected in the DNAPL storage tank located behind the water treatment plant for removal off-site; the groundwater is treated in the water treatment plant.

The PRP completed an evaluation of the DNAPL recovery program during 2002 which concluded that the enhanced system had "reached a point of diminishing returns" and that the monitoring data indicated that the DNAPL area appeared to be stable in extent (BBL, 2003a). The DNAPL recovery evaluation also showed that during enhanced recovery operations, there was a direct relationship between DNAPL recovery rates and groundwater pumping rates. The report noted that "within the range of pumping rates tested, at higher groundwater pumping rates, a greater volume of DNAPL was recovered" (BBL, 2003).

In early 2003, EPA and the PRP discussed the PRP's recommendation to switch to a wholly passive system, operate the system and monitor the results for 1 year and, based on the results, recommend modifications for future passive recovery activities. The PRP submitted an "Operation and Monitoring Plan Modification for DNAPL Recovery" to the agencies that proposed modifications to the DNAPL recovery system based on the above recommendations (BBL, 2003a). An objective of the plan modification was to collect additional information to modify the system to operate in a passive mode after decommissioning of the water treatment plant (BBL, 2003a).

In May 2003, the PRP began operating the DNAPL recovery system in passive mode and collecting data for the system evaluation. Following the 1 year evaluation period, the PRP planned to summarize all data and information in a report that would include recommendations for long-term changes to the DNAPL recovery system operations (BBL, 2003a). The July 2004 Long-Term Monitoring Report included a summary of the DNAPL gauging data (BBL, 2004c). The volumes of DNAPL recovered, and other relevant recovery system data are discussed in Section 6.4.2.

4.3.7 Technical Impracticability of Groundwater Restoration

During 1997, the PRP conducted investigations to establish site-wide groundwater quality conditions and determine whether it would be practical to restore groundwater at the site to drinking water standards. The investigations involved drilling one soil boring downgradient of Kettle Pond, installing 24 pore water sample points in Hocomonco Pond, conducting a site-wide groundwater level and DNAPL measurement event, and performing a groundwater and pore water sampling and analysis round at 55 locations on-site (Fluor Daniel GTI, 1998). Groundwater and pore water samples were collected and analyzed for PAHs, BTEX, and filtered and unfiltered (total) arsenic and chromium.

While the interim cleanup levels established in the SDD were exceeded in some locations for total, or unfiltered, arsenic and chromium samples, the filtered results showed chromium and arsenic concentrations below the cleanup levels, with the exception of one arsenic exceedance. The exceedance of the cleanup level for total arsenic was attributed to reducing conditions found in the Kettle Pond area. Benzene and naphthalene were the most frequently detected contaminants exceeding the interim groundwater cleanup levels (Fluor Daniel GTI, 1998). Since benzene and naphthalene had historically exceeded the cleanup levels, the technical impracticability (TI) evaluation focused on these compounds as the primary constituents of concern. The results and conclusions of this investigation were presented in a "Report Demonstrating the Technical Impracticability of Restoring Groundwater at the Hocomonco Pond Site," dated April 1998.

During this time frame, sediment data from samples collected along the southeast side of Hocomonco Pond showed increasing concentrations of PAHs. These results suggested that groundwater from the Kettle Pond area containing dissolved PAHs, primarily naphthalene, was discharging through remediated sediments into the southern portion of the pond. A sediment sampling plan was developed in 1998 using guidance provided by EPA and was used to collect a round of sediment samples from three locations in December 1998 (BBL, 2001).

The TI report concluded that there were two primary DNAPL entry locations on the site, the Kettle Pond area and the former lagoon area. Soil samples collected from borings in the Kettle Pond area confirmed that DNAPL was present in both shallow and deep soil samples; test pits in the former lagoon area encountered DNAPL in the unsaturated soils (Fluor Daniel GTI, 1998). The investigations determined that remedial actions at these two areas were able to mitigate the presence and/or migration of DNAPL, even though DNAPL might be present at other locations on the site.

The TI investigations determined that the till layer located beneath the glacial drift aquifer not only acted as a barrier to vertical migration of DNAPL, but also enhanced the horizontal migration of DNAPL (Fluor Daniel GTI, 1998). The lateral extent of DNAPL contamination at the former lagoon area was estimated to be approximately 125 feet from north to south and approximately 100 feet from west to east. The lateral extent of DNAPL contamination at the Kettle Pond area was estimated to be 375 feet from northeast to southwest and approximately 250 feet from southeast to northwest (Fluor Daniel GTI, 1998). The residual and free phase DNAPL had migrated downward through the glacial drift deposits in areas across the site. In the area west of Kettle Pond, DNAPL was found to a maximum depth of 170 feet bgs (Fluor Daniel GTI, 1998). At the former lagoon area, DNAPL was found in the unsaturated zone, extending to the water table surface, as the downward migration of DNAPL was limited.

Due to the lack of DNAPL at depth around the former lagoon area, DNAPL recovery efforts were focused to the area west of Kettle Pond. By September 1999, approximately 31,000 gallons of creosote DNAPL had been recovered. Given the extent of DNAPL contamination present at the site, the TI report concluded that: "The presence of residual phase DNAPL represents a long-term source for impacts to groundwater since this phase of DNAPL is difficult to remove. Locating all free phase DNAPL sources and the inability to remediate residual phase DNAPL makes groundwater restoration technically impracticable" (Fluor Daniel GTI, 1998).

The report also stated that there was no significant risk to human health or the environment posed by the presence of free phase or residual phase DNAPL at the site, and suggested implementing institutional controls to mitigate potential future risk. Based on these conclusions, the EPA "Guidance for Evaluating the Technical Impracticability of Groundwater Restoration," and other relevant documents, the PRP requested a waiver of interim groundwater cleanup levels for the areas within the defined TI zone. The horizontal extent of the TI zone is shown in Figure 4-2. The vertical extent of the TI zone was defined as follows: Kettle Pond area (286 feet to 202 feet above mean sea level), area west of Kettle Pond (279 feet to 155 feet above mean sea level), and the former lagoon area (306 feet to 282 feet above mean sea level) (Fluor Daniel GTI, 1998).

4.3.8 1999 Explanation of Significant Differences

Based on the PRP's TI Report, EPA determined that "remediating groundwater to drinking water quality may not be achievable in certain areas of the Hocomonco Pond Site" (EPA, 1999). The 1992 SDD allowed for the re-evaluation of the interim cleanup levels during implementation of the selected remedy. The interim groundwater cleanup levels established in the SDD assumed that groundwater restoration was an achievable goal. On September 21, 1999, EPA issued a second ESD that waived the groundwater ARARs and interim cleanup levels in the two TI zones identified in the PRP's TI report. The 1999 ESD also required that DNAPL recovery continue until it is determined to be "no longer technically practicable."

EPA and MassDEP concluded that this modified remedy was adequately protective of human health and the environment because institutional controls, long-term monitoring, and continuing DNAPL recovery activities were required as part of the TI waiver (EPA, 1999). The 1999 ESD allowed the in-situ bioremediation system to be discontinued, but required DNAPL recovery to "continue until the EPA and MADEP give a written approval stating otherwise" (EPA, 1999). The 1999 ESD also required groundwater monitoring and surface water and sediment sampling to ensure that the groundwater is hydraulically contained and contaminant levels do not increase in concentration or extent. Should levels increase, the ESD stated that additional site work or engineering controls may be required. Finally, the 1999 ESD required that a deed restriction be placed on the Hocomonco Pond property to prohibit groundwater extraction, as discussed in Section 4.3.9 below. The PRP prepared a long term monitoring plan (LTMP), as required by EPA in the 1999 ESD. The LTMP, revised September 2001, is discussed in Section 4.5.

4.3.9 Institutional Controls

The ROD and various decision documents state that deed restrictions are required for specific areas of the site. The ROD required placement of deed restrictions on the area of the former lagoon cap, to prohibit development in the area, and also along the embankment of Otis Street (EPA, 1985). The ROD also required land use restrictions on the on-site landfill to prohibit any future development, similar to that required for the former lagoon area (EPA, 1985). The 1999 ESD included a requirement for another deed restriction to "prohibit extraction of the groundwater for purposes other than the remedial action unless the extracted groundwater meets or is treated to appropriate water use and/or disposal standards in effect at the time of extraction and the extraction of the groundwater does not adversely affect the remedial action" (EPA, 1999).

4.4 <u>Operations and Maintenance</u>

The ROD specified the following O&M activities for the former lagoon area: long-term groundwater monitoring, cap maintenance, and mowing to maintain the cover and prevent tree growth (EPA, 1985). In addition, institutional controls in the form of deed restrictions were required, as described in Section 4.3.9. The O&M activities are required by the ROD for an indefinite period of time "since in-situ physical, chemical or biodegradation mechanisms are not expected to reduce the material to a non-hazardous classification for many years" (EPA, 1985). Monitoring wells were installed around the perimeter of the former lagoon (see Section 4.3.3). Following baseline monitoring, annual groundwater monitoring was initiated in 1995. The annual monitoring results are discussed in Section 6.4.1.

The ROD specified the following O&M activities for the on-site RCRA double-lined landfill: groundwater monitoring, facility inspection and maintenance, and leachate collection and treatment. In addition, land use restrictions were required, as described in Section 4.3.9. The O&M requirements for the landfill are consistent with the RCRA post-closure care and groundwater protection requirements. The landfill and former lagoon area are visually inspected on a periodic basis and the four monitoring wells around each area are sampled annually. The results of the O&M activities for the on-site landfill are discussed in Section 6.4.1.

The remedy for the Otis Street area specified periodic surface water monitoring at the Hocomonco Pond discharge stream as the only O&M requirement. This monitoring requirement has been fulfilled (Anderson, 2004). No surface water monitoring was performed during the current five-year review period. As noted in Section 4.3.9, the ROD also required a deed restriction for the Otis Street embankment (EPA, 1985).

The remedies for the isolated areas, Hocomonco Pond and discharge stream, and the Kettle Pond area all involved placement of dredged or excavated materials in either the former lagoon area or in the on-site landfill designed to meet RCRA technical standards. Therefore there are no separate O&M activities specified in the ROD for these areas beyond those described above.

The ROD estimated the following costs for the O&M activities associated with the selected remedies:

- Former lagoon area - $21,000 annually for water quality monitoring and cap maintenance;
- On-site landfill - $20,000 annually for water quality monitoring; and
- Otis Street storm drain - $5,000 annually for discharge monitoring.

Site costs from the period of 2004 to 2008 have ranged from $120,000 to $216,000 annually and have averaged about $155,000 (Bollinger, 2009c). The modifications to the ROD-selected remedies specified in the 1992 ESD and 1999 ESD have changed the groundwater RAO from plume restoration to plume containment. This resulted in establishment of the LTMP and a monitoring program different from that envisioned in the ROD. No cost estimate for the LTMP was available. The O&M activities for the landfill and former lagoon area, as well as the LTMP, continue to be implemented as required.

4.5 Long Term Monitoring Plan

As mentioned in Section 4.3.8, consistent with the terms of the 1999 ESD and the TI waiver, the PRP developed a long term monitoring plan (LTMP) for groundwater, DNAPL, and sediment to confirm that levels do not increase in concentration or extent. The first phase of the long term monitoring program included performance of baseline biological monitoring in May 2002. The objective of this monitoring was to characterize the conditions prior to commencement of routine long-term monitoring and collect baseline data to be used to confirm that the TI waiver remains a protective remedy. The baseline monitoring included analysis of sediment samples for PAHs, total organic carbon (TOC), grain size, and percent solids, sediment bioassay testing, and a benthic invertebrate community survey. The benthic survey included locations within the TI zone as well as reference locations elsewhere in Hocomonco Pond.

The LTMP required semi-annual sampling events for a period of 5 years. The 5 years of data would then be used to identify any notable trends according to the criteria in the LTMP (e.g., increasing, decreasing, or no trend). This evaluation, following the decision tree outlined in the LTMP, would be the basis for decisions regarding continued monitoring at the site, or other actions.

The LTMP was implemented in late 2000, with the first semi-annual event conducted in November. The elements of the LTMP include: water level measurements in 63 wells (semi-annually); groundwater sampling of 6 wells (semi-annually) and 2 wells (annually); measurement of DNAPL thickness (annually); and sediment sampling at 4 locations (semi-annually). Groundwater samples were analyzed for PAHs and BTEX. Sediment samples were analyzed for PAHs, TOC, percent solids, and grain size. Analysis for arsenic and chromium was not included as part of the LTMP based on the results and conclusions of the 1997 investigation which supported the TI waiver and 1999 ESD.

In addition, the 1999 ESD also required collection of sediment samples. Each sample was a composite collected from the upper 6 inches of sediment. All sediment samples were analyzed for PAHs, TOC, and grain size. A Sediment Sampling Plan, initially developed in 1998, was included as Appendix A of the LTMP. This Plan states that the sediment sample results will be compared to the criteria established in the SDD. A cleanup level of 35 mg/kg total PAHs was established for the protection of aquatic life; a cleanup level of 4 mg/kg phenanthrene was established for shallow sediments (e.g., less than 2 feet). Note that a human health cleanup level of 4 mg/kg was established for carcinogenic PAHs for sediments in Hocomonco Pond; however, this cleanup level is not mentioned in the Sediment Sampling Plan. If the sediment monitoring data indicate that cleanup levels are exceeded, the Plan states that the agencies and PRP will "discuss and agree upon appropriate additional investigative activities" (BBL, 2001).

The locations and frequency of sampling outlined in the LTMP for groundwater and sediments are summarized in the table below. The long-term monitoring data are discussed in Section 6.4.4.

LONG-TERM MONITORING SAMPLING LOCATIONS/FREQUENCY		
Groundwater Monitoring Well	**Location (see Figure 4-2)**	**Sampling Frequency**
BMW-3	Upgradient of Kettle Pond TI zone	Spring and Fall
M-15S	Within Kettle Pond TI zone	Spring and Fall
M-15D		Spring and Fall
A-9	Downgradient of the Kettle Pond TI zone	Spring and Fall
TRC-3S	Between northeastern end of Kettle Pond TI zone and Hocomonco Pond discharge stream	Spring and Fall
TRC-3D		Spring and Fall
MLC-1	Upgradient of former lagoon TI zone	Fall
MLC-2	Downgradient of former lagoon TI zone	Fall
Sediment Sample	**Location**	**Sampling Frequency**
SED-1 / T1	Within Kettle Pond TI zone, where groundwater is expected to discharge to the pond	Spring and Fall
SED-2 / T2		Spring and Fall
SED-3 / DSREF1	Between T3 and T4, not likely influenced by groundwater from Kettle Pond TI zone	Spring and Fall
SED-HP / DS-HP	Northern edge of Kettle Pond TI zone, not likely influenced by groundwater from Kettle Pond TI zone	Spring and Fall

Source: BBL, 2001

5.0 PROGRESS SINCE LAST FIVE-YEAR REVIEW

Since the last five-year review conducted in 2004, the Final Long-Term Monitoring Report was completed by the PRPs and O&M was continued.

Recommendations and follow-up actions identified in the previous five-year review included the following:

- Finalize and record deed restrictions – *Progress: Not yet completed*
- Increase frequency of sampling MLC-2 from annual to semi-annual; include GW-1 standards in all future groundwater monitoring evaluations – *Progress: The frequency of sampling for MLC-2 remained annual. GW-1 standards were not included in the Final Long-Term Monitoring Report (BBL, 2005), but were presented in groundwater summary tables for annual monitoring performed from 2006 to 2008. Where some wells were previously sampled on a semi-annual basis, it should be noted that only annual sampling has been performed beginning in 2006.*
- Use SIMs analytical method for PAHs to achieve lower reporting limits – *Progress: The detection limits for benzo(a)pyrene remained above the Interim Groundwater Cleanup Level (IGCL) of 0.2 ug/L. EPA was informed by the PRP that SIM analysis was performed for recent monitoring. However, the groundwater results provided through the most recent 2008 sampling event remain well above the IGCL.*
- Complete passive DNAPL recovery evaluation – *Progress: DNAPL recovery results are provided monthly along with historical results, for both enhanced and passive operation. A formal evaluation has not been performed.*
- Complete evaluation of long-term monitoring data and include GW-1 standards in evaluation – *Progress: The Final Long-Term Monitoring Report (BBL, 2005) was completed following the spring 2005 sampling event. As noted above, GW-1 standards were not included in the evaluation.*
- Compile all O&M and long-term monitoring data for use in second five-year review – *Progress: The long-term monitoring data along with available O&M data have been compiled for use.*
- Re-evaluate potential routes of exposure based on collection of new surface water and fish tissue data to determine potential reuse of the site for catch-and-release fishing or swimming – *Progress: New surface water and fish tissue data have not been collected; however, .risk characterization performed in 1992 concluded that there was no*

significant risk associated with these pathways and based on this five-year review (see Section 7.2), no change to that conclusion is expected.

The previous five-year review concluded the following protectiveness statement:

"The remedies for the Hocomonco Pond Site are expected to be protective of human health and the environment once the deed restrictions are in place. In the interim, exposure pathways that could result in unacceptable risks are being controlled. Continuation of post-closure care for the on-site and fill and former lagoon area cap is required to ensure the remedy remains protective. Consistent with the 1999 ESD, DNAPL recovery must continue until EPA and MADEP provide written approval stating otherwise. Long-term monitoring required by the 1999 ESD must continue consistent with the LTMP. Following the evaluation of the passive DNAPL recovery operation (expected in the 4^{th} quarter of 2004) and the 5-year assessment of trends indicated by the monitoring data (expected in early 2006), recommendations, such as continued monitoring, additional site work, or engineering controls, will be made to ensure the remedy remains protective of human health and the environment in the long term."

Progress/Status: As indicated above, deed restrictions have not yet been finalized. Consistent with the 1999 ESD, DNAPL recovery has continued during the past five years. Long-term monitoring required by the 1999 ESD continued until spring 2005, and at a reduced level since 2005. A five-year assessment of trends indicated by the monitoring data was submitted during this five year time period. Since the previous five-year review, regular O&M activities related to the landfill covers and DNAPL recovery system have occurred at the site. Additional sediment samples were collected in July 2009 from Hocomonco Pond in support of this five-year review. Results from this sampling event are presented in the next section.

6.0 FIVE-YEAR REVIEW PROCESS

This section provides a summary of the five-year review process and the actions taken by the EPA to complete the review.

6.1 Administrative Components

The Hocomonco Pond five-year review team was led by Jim DiLorenzo of EPA, Remedial Project manager for the site. Jay Naparstek of MassDEP, Steve Mangion (EPA hydrologist), and Bart Hoskins (EPA risk assessor), as well as staff from Metcalf & Eddy, Inc. with expertise in hydrogeology and risk assessment, were also part of the review team.

The schedule established by EPA included completion of the five-year review by September 2009.

6.2 Community Notification and Involvement

A public notice was prepared and sent to two local newspapers. The public notice was published in the Metrowest Daily News on July 31, 2009 and the Westborough News on August 7, 2009. The notice described EPA's five-year review of the Hocomonco Pond site remedy.

The ROD noted that, while community interest dated back to 1976, when an oily discharge from the storm sewer drainage pipe was noticed by a local resident, in general community interest had not been high. Several specific concerns raised by the community were noted in the ROD, including water quality, the expansion of the water supply at the Otis Street municipal well, and restoration of Hocomonco Pond as a recreational area (EPA, 1985). Although not specifically required, EPA provided public comment periods on the proposed 1992 ESD for the Kettle Pond area and on the proposed 1999 ESD for modification of the groundwater remedy, to ensure full community involvement (EPA, 1992a; EPA, 1999).

During a visit to the site on July 7, 2009, the EPA briefly described the five-year review process to the town officials and asked for comments regarding the site. A site inspection report is attached as Appendix B and interview summaries are attached as Appendix C.

6.3 Document Review

This five-year review consisted of a review of the documents listed below.

- Record of Decision (ROD), 1985
- Supplemental Public Health and Environmental Assessment for the Hocomonco Pond and its Discharge Stream, 1989
- Public Health and Environmental Assessment for the Hocomonco Pond and its Discharge Stream, 1992
- Public Health and Environmental Assessment for Kettle Pond and Isolated Areas, 1992
- Cleanup Levels for Sediments, Soils and Groundwater and Limits of Excavation of Sediments and Soil, September 28, 1992
- Explanation of Significant Differences, 1992
- Technical Impracticability Demonstration Report, 1998
- Explanation of Significant Differences, 1999
- Long-Term Monitoring Plan, 2001
- Baseline Biological Monitoring Report, 2003
- 1st Five Year Review Report, 2004
- Reuse Assessment for the Hocomonco Pond Site, 2004
- Final Long-Term Monitoring Report, 2005
- Monthly Status Reports, 2004 to 2009

Complete references are provided in Appendix A.

6.4 Data Review

A review was completed of various PRP-contractor plans and monitoring reports. A summary of relevant data regarding the components of the site remedy is presented below.

6.4.1 Landfill and Former Lagoon Area Monitoring and Inspections

Annual monitoring of the four wells around the landfill (LF-1 through LF-4) and the four wells around the lagoon (MLC-1 through MLC-4) began in 1995 (see Figure 4-2). The certification reports indicated that 5 years of data (e.g., 1995 - 2000) would be sufficient to assess the effectiveness of the landfill liner and the landfill and lagoon caps (Fluor Daniel GTI, 1997; 1997a). *The lagoon final design documents stated that if the PAH concentrations are steady or* decreasing it is assumed that the caps are effective and the routine annual monitoring would continue (Chester, 1993).

Samples were collected from these eight monitoring wells during the 1997 TI investigations to establish site-wide groundwater conditions to demonstrate the technical impracticability of groundwater restoration. Groundwater samples from all eight wells were analyzed for PAHs. All of the sample results were non-detects except for well MLC-2 where acenaphthene and naphthalene were detected (97 µg/l and 5,500 µg/l, respectively) (Fluor Daniel GTI, 1998). BTEX, arsenic, and chromium analyses were completed for samples from MLC-1 and LF-1, the two upgradient wells. Chromium was the only compound detected in both wells above the method reporting limit. The chromium concentrations (138 µg/l and 1020 µg/l, respectively) exceeded the interim groundwater cleanup level (100 µg/l) (Fluor Daniel GTI, 1998).

For the four wells around the landfill, the only detections noted in available annual monitoring results since the last five-year review (October 2004, November 2006, November 2007, and November 2008) were in LF-2 in October 2004 (1.7J ug/l acenaphthene, 1.6J ug/l fluoranthene, 2.9J fluorene, and 6.6 ug/l phenanthrene). Samples were analyzed for BTEX compounds and PAHs (BBL, 2005; Bollinger, 2009).

With respect to the four wells around the former lagoon, there have been no detections of BTEX or PAHs noted in available annual monitoring results since the last five-year review for MLC-1 (upgradient location). Note that arsenic and chromium were not included in the analysis at wells around the former lagoon in the past five years. BTEX compounds have not been detected at MLC-4; however, all were detected at MLC-2 and MLC-3 each round analyzed (see Appendix D). Benzene has been detected above the IGCL multiple times in each well. Acenaphthene and naphthalene have been detected at MLC-4 at concentrations well below the IGCLs. However, no PAHs were detected at this location during the 2008 annual monitoring round. Acenaphthene, acenaphthylene, fluorene, 2-methylnaphthalene, naphthalene, and phenanthrene have been detected in MLC-2 and MLC-3 multiple times. For the analytes which have IGCLs (acenaphthene, naphthalene, and fluorene), detection concentrations were well below the established IGCLs, except for naphthalene, which was detected in MLC-2 and MLC-3 at concentrations exceeding the IGCL. Of the remaining three analytes noted, only 2-

methylnaphthalene was detected at concentrations greater than GW-1 standards. It should be noted that 2-methylnaphthalene has not historically been included in the PAH analyte list. Therefore, it was not evaluated in the SDD and these exceedances of the GW-1 standards should be reviewed further before any conclusions are drawn (see Section 7.2). Table D-1 in Appendix D presents results associated with detected analytes for MLC-2, MLC-3, and MLC-4 (see also Section 6.4.4). Although benzo(a)pyrene is presented as non-detect for all sampling events, the detection limit reported is greater than the IGCL for benzo(a)pyrene. No conclusion can be drawn with respect to this analyte.

Historically, the landfill cap has been visually inspected semi-annually and the former lagoon area cap has been visually inspected annually. Inspections continued during this five-year review period; however, the frequency is not known. The most recent inspection reports from June 2009 were provided by the PRP for review (Bollinger, 2009a). The reports indicated that the caps had recently been mowed and vegetation was cleared. No evidence of settlement or erosion was noted on either cap. Leachate is no longer being generated and collected from the landfill.

6.4.2 DNAPL Recovery

The DNAPL recovery system has been in operation since 1995. Between 1995 and May 2009, approximately 60,452 gallons of DNAPL have been recovered. Approximately 58,108 gallons of the total volume recovered were collected from the DNAPL recovery wells, DRW-1, DRW-2, DRW-3, and A-10 (Arcadis, 2009b). The balance of the DNAPL was collected from other wells when greater than 1 foot of DNAPL was present during routine gauging for DNAPL as part of the LTMP.

Between 1998 and May 2003 the DNAPL recovery system operated in a dual enhanced/passive mode. Since May 5, 2003, the system has operated only in a passive mode in accordance with the PRP's April 14, 2003 O&M modifications (BBL, 2003a). The proposed 1-year passive mode evaluation period has continued beyond May 2004 to allow for the collection of additional passive recovery data (Golden, 2004). The system continues to operate in passive recovery mode. The volumes of DNAPL collected to date, over approximately 12-month periods, are summarized below for DRW-1 and DRW-2. These two recovery wells were operated in an enhanced/passive mode until May 5, 2003 and now operate in a passive mode along with the other DNAPL recovery wells.

DNAPL RECOVERED FROM DRW-1 & DRW-2, FEBRUARY 1998 – JANUARY 2009			
Time Period	**DRW-1 (gallons)**	**DRW-2 (gallons)**	**Mode***
2/6/98 – 4/1/99	3565	2817	Enhanced/passive
4/1/99 - 4/13/00	2672	5345	Enhanced/passive
4/13/00 – 4/26/01	2697	2787	Enhanced/passive
4/27/01 – 5/9/02	2990	3372	Enhanced/passive
5/9/02 – 5/5/03	1771	1867	Enhanced/passive
May 2003 – April 2004	123	572	Passive
May 2004 – April 2005	29	353	Passive
May 2005 – April 2006	111	295	Passive
May 2006 – April 2007	80	371	Passive
May 2007 – April 2008	68	369	Passive
May 2008 – April 2009	123	412	Passive

* During enhanced mode groundwater was pumped from DRW-1 at 10 gpm and from DRW-2 at 5 gpm.

Source: BBL, 2002; BBL, 2004d; Arcadis, 2009b

The volumes of DNAPL recovered during passive operations between December 2003 and May 2009 are summarized in Table D-2 in Appendix D. There have been no noticeable trends in DNAPL recovery during both enhanced/passive and passive only modes of operation. However, there was a significant reduction in the DNAPL recovery rate as a result of the change from enhanced/passive to fully passive.

6.4.3 Water Treatment Plant Effluent Discharge Monitoring

The water treatment plant was designed to operate in conjunction with the in–situ bioremediation system and sized to treat groundwater extracted from the five Kettle Pond area BRW wells. After the bioremediation system was shut down and groundwater recovery in the Kettle Pond area ceased, the volume of groundwater received by the plant was limited to that pumped from DRW-1 and DRW-2 during the enhanced operation phase of the DNAPL recovery system, described in Section 4.3.6. Due to the greatly reduced volume of groundwater, the water treatment plant was switched to operate in a batch, rather than a continuous mode, treating groundwater approximately 2 days a week, 8 hours a day, four weeks out of every six (Beazer, 1998).

The treated effluent data for the period of July to October 1998 and January to April, June and August 1999 showed no detections of arsenic, chromium, or hexavalent chromium, the only compounds with "Gold Book" criteria applicable for the effluent discharge (Beazer, 1999). In 1998 the PRP proposed a modification to the plant monitoring schedule. The proposed modified monitoring schedule eliminated further analyses for these three compounds and included analysis once per batch cycle for pH, TSS, BTEX, PAHs, and a semi-annual acute toxicity screening (Beazer, 2001). After review of the 1998 and 1999 effluent data, the agencies agreed to the modifications to the monitoring schedule (Golden, 2004).

Effluent data covering the period from October 2002 through June 2004 (during batch operations of the treatment plant) have shown no detections of BTEX, PAHs, or phenols in the treated effluent (Bollinger, 2004). The October 2002 acute toxicity results showed comparable cumulative percent mortality data for the primary control and the 100% effluent tests (Bollinger, 2004).

Since the DNAPL recovery system was changed from enhanced/passive operation to all passive in May 2003, the water treatment plant has been operated in batch mode on an as needed basis to treat build-up of water in DNAPL storage tanks. No effluent data have been collected since the previous five-year review.

6.4.4 Long Term Monitoring

The LTMP includes baseline biological monitoring and routine monitoring, as described in Section 4.5. The results of the May 2002 baseline monitoring and routine long-term monitoring from fall 2000 through spring 2009 are discussed below.

<u>Baseline Monitoring Results</u>

The baseline monitoring program was conducted in May 2002 at the four sediment sample locations shown on Figure 4-2 and the table in Section 4.5. A second reference station was also sampled due to the abundant leaf litter found at station SED-3 (AMEC, 2003). The analytical results for the sediment samples are discussed below along with the other routine sediment long term monitoring data.

The bioassay toxicity test results were analyzed using t-tests. No statistically significant differences were found in survival or growth of the midge larvae (*C. tentans*) or amphipods (*H. azteca*) between the two site (e.g., within the TI zone) and three reference locations (AMEC, 2003). The t-test results for the benthic macroinvertebrate community survey indicated no statistically significant differences between the site and reference locations (AMEC, 2003). The only individual metrics found to be statistically significant between the site and reference locations were noted for the Hilsenhoff Biotic Index and percent crustaceans and mollusks. These differences appeared attributable to the results from station SED-2 (T2) (AMEC, 2003).

According to the LTMP, further biological studies would be performed if PAH concentrations in the sediment exceed the cleanup levels established in the SDD and show a statistically increasing trend. Should these conditions occur, the LTMP decision tree outlines the steps that the PRP would take to evaluate if additional biological monitoring is appropriate (AMEC, 2003).

Routine Long-Term Monitoring Results

As discussed in Section 4.5, routine long-term monitoring includes groundwater level and DNAPL thickness measurements, and groundwater and sediment sample collection and analysis. The monitoring results over the five-year period from fall 2000 to spring 2005 are discussed below. Sample locations are shown on Figure 4-2 and described in the table in Section 4.5.

The reporting frequency outlined in the LTMP has been modified based on agreements between EPA, MassDEP, and the PRP. All parties agreed that it would be beneficial to use two or more years of data in the evaluation of the monitoring data outlined in the LTMP (Golden, 2004). Data collected in accordance with the LTMP during 2000 and 2001 were presented and findings summarized in a Long Term Monitoring Report, June 2002 (BBL, 2002a). A second Long Term Monitoring Report, summarizing the data and findings for 2002 and 2003, was submitted to the agencies on July 30, 2004 (BBL, 2004b). In accordance with the LTMP, after five years the data collected from the semi-annual events were evaluated to identify trends in constituent concentrations in groundwater and selected sediments. Following the spring 2005 semi-annual event, a five-year data evaluation was completed (BBL, 2005) and discussions have been ongoing since that time regarding a determination as to the future monitoring required to demonstrate that the remedy and TI waiver documented in the 1999 ESD remains protective of human health and the environment. Annual groundwater monitoring and DNAPL measurements have been performed in November of the past three years (2006 to 2008).

Water level measurements collected from all 63 wells on the site during each event indicate that the groundwater flows consistently northwest across the site toward Hocomonco Pond. During the fall events, the water levels in the wells at the north end of the site suggest that groundwater may flow northward in the areas of A-9 and the TRC-3 cluster toward the wetland areas northeast of Otis Street (see Figure 4-2 for well locations) (BBL, 2005). Contour maps presented in the first Long-Term Monitoring Report showed a capture zone associated with wells related to the enhanced DNAPL recovery system (BBL, 2002a). This capture zone was not apparent in the reports which followed. Groundwater contours maps illustrating hydraulic gradients during enhanced DNAPL recovery operations in 2002 and hydraulic gradients during passive only DNAPL recovery in 2005, are included as Appendix F.

DNAPL was detected in 14 of the 63 wells during the 2000 – 2001 period and in 10 to 12 of the same wells during the subsequent measurement rounds through May 2005. DNAPL was detected in an additional four wells at least once beginning in 2006. The apparent DNAPL thickness varies between gauging rounds and ranged from trace to 17.43 feet (A-4; May 21, 2003) (BBL, 2005). All detections of DNAPL have been observed in wells in the Kettle Pond TI zone and, except for a few wells in 2006, DNAPL was consistently detected in the same wells. Over the 2000 – 2009 period, DNAPL was not detected in any of the other 49 wells on the site. The DNAPL thicknesses recorded over the 2000 – 2009 period are summarized in Table D-3 of Appendix D.

Groundwater monitoring data for the monitoring wells upgradient of and outside both TI zones (BMW-3 and MLC-1) and downgradient of and outside the Kettle Pond TI zone (A-9, TRC-3D, TRC-3S) showed no exceedances of the interim groundwater cleanup levels during the long-term monitoring period (BBL, 2005). The cleanup levels for benzene and naphthalene were consistently exceeded at the wells located within the Kettle Pond TI zone (M-15S, M-15D). Attaining the cleanup levels within the TI zones was waived by the 1999 ESD. However, the benzene and naphthalene cleanup levels at MLC-2 and MLC-3, downgradient and outside the former lagoon area TI zone, have also been consistently exceeded. Concentrations of benzene at well MLC-2 ranged from 4.4 μg/l (November 2007; the only monitoring round below the cleanup level) to 22.6 μg/l (October 2003). Naphthalene concentrations in well MLC-2 increased between November 2000 (2,000 μg/l) and October 2002 (4,730 μg/l) and then decreased to a range of 1,240 to 2,230 μg/l between October 2003 and November 2008 (BBL, 2005; Bollinger, 2009). Concentrations of benzene at well MLC-3 ranged from 36.1 μg/l (November 2008) to 67.1 μg/l (November 2006). These concentrations are well above the cleaup level (5 μg/l). Detected naphthalene concentrations in well MLC-3 were only above the cleanup level once (1,630 μg/l; November 2006) between October 2004 and November 2008. (BBL, 2005; Bollinger, 2009).

Although the available data since November 2000 from all of the wells, with two exceptions (4 μg/l at M-15S in May 2001 and 0.79 μg/l at M-15D in October 2003), have shown benzo(a)pyrene as non-detect, the reporting limit for benzo(a)pyrene was higher than the interim groundwater cleanup level (0.2 μg/l) for all monitoring events.

The analytical results for the wells where exceedances have been consistently noted are shown in Table D-4 in Appendix D.

The PRP's November 2005 Final Long-Term Monitoring Report presented results for time trend analyses and regression analysis using data for the three wells where interim groundwater cleanup levels are consistently exceeded (M-15S, M-15D, and MLC-2). The analyses indicated that benzene and naphthalene concentrations in M-15D are decreasing. Benzene concentrations in M-15S show an overall slight decreasing trend. However, naphthalene in the same well shows a slight increasing trend. The analyses for MLC-2 were based on only five data points and showed an apparent increase in benzene concentrations and an apparent decrease in naphthalene concentrations (BBL, 2005). Additional evaluation of downgradient wells TRC-3S and TRC-3D showed both with decreasing trends for benzene. While TRC-3D showed a decreasing trend for naphthalene, TRC-3S showed an increasing trend, with a maximum naphthalene concentration of 890 μg/l detected in October 2004 followed by a non-detect (< 5.2 μg/l) in June 2005.

Sediment sample results over the October 2000 to October 2005 long-term monitoring period show no exceedances of the ecological cleanup levels for total PAH (35 mg/kg) and phenanthrene (4 mg/kg) at stations SED-HP, SED-2, and SED-3, with the exception of one exceedance of the total PAH limit at SED-2 in May 2003 (36 mg/kg) (BBL, 2005). Over this five-year period, the concentrations of total PAHs ranged from non-detect to 0.9 mg/kg at SED-HP and SED-3 (reference station DS-REF-1). There were no detections of phenanthrene at SED-3 and only minor detections at SED-HP in the last three sampling rounds (0.06 to 0.13 mg/kg). Stations SED-2 and SED-1 are both located within the Kettle Pond TI zone, in the area where groundwater from the Kettle Pond area is expected to discharge to Hocomonco Pond. The long-term monitoring results compared to the initial 1998 data for these two sediment stations are summarized in the table below.

LONG-TERM MONITORING RESULTS – SEDIMENTS											
Well	**Dec. 1998**	**Oct. 2000**	**May 2001**	**Nov. 2001**	**May 2002**	**Oct. 2002**	**May 2003**	**Oct. 2003**	**May 2004**	**Oct. 2004**	**May 2005**
	Sediment Concentrations (mg/kg)										
SED-1 (T-1)											
Total PAHs*	105	90.8	69.0	21.5	144	51 (avg)	52 (avg)	60.1	51.6	67.5	79.4
Phenanthrene**	9.6	3.9	3.9	1.7	9.3	7.0 (avg)	4.2 (avg)	6.0	7.3	8.3	4.2
SED-2 (T-2)											
Total PAHs*	32.6	13.2	15.6	14.8 (avg)	23.0 (avg)	8.9	36	18.1	32.5 (avg)	24.73	34.2 (avg)
Phenanthrene**	< 4.3	0.43	1.0	1.02 (avg)	2.25 (avg)	0.66	2.3	1.2	2.7 (avg)	2.2	2.3 (avg)

* Ecological cleanup level = 35 mg/kg (Assumes non-detects are equal to zero); note that the human health cleanup level of 4 mg/kg is for carcinogenic PAHs only and not readily comparable to Total PAHs

** Ecological cleanup level = 4 mg/kg

avg = Average of duplicate samples

Source: BBL, 2005

Concentrations of total PAHs and phenanthrene in sediments from station SED-2 have ranged from 13.2 mg/kg to 36 mg/kg and 0.43 mg/kg to 2.7 mg/kg, respectively. These concentrations are comparable to the 1998 results for this station. Sediments from station SED-1 have exceeded the total PAH cleanup level in 9 of the 10 sampling events over the October 2000 to May 2005 period. Total PAH concentrations have ranged from 21.5 mg/kg (November 2001) to 144 mg/kg (May 2002). The phenanthrene cleanup level was exceeded in the May 2002 through May 2005 events, at concentrations ranging from 4.2 mg/kg (May 2003 and May 2005) to 9.3 mg/kg (May 2002) (BBL, 2005). These concentrations are comparable to the 1998 results for this station. The concentrations of total PAHs and phenanthrene declined from

December 1998 until November 2001, increased significantly in May 2002, and have subsequently declined slightly, although with no consistent downward trend.

The long-term monitoring reports did not present a breakdown/comparison for carcinogenic PAHs. Therefore, it is not clear if the human health cleanup goal of 4 mg/kg for cPAHs has been exceeded during these historical sampling events.

<u>2009 Sediment Sampling</u>

In support of this five-year review, additional sediment samples were collected in July and August 2009 from Hocomonco Pond. Samples were collected in July 2009 from the long-term monitoring locations (SED-1, SED-2, SED-3, and SED-DSHP), as well as two locations further away from shore, SED-1A and SED-2A. Monitoring location SED-DSHP was re-sampled in August 2009. These locations are shown on the figure included in Appendix G. SED-1A is located within the zone which was previously excavated, while SED-2A is located outside of the remediation zone.

Preliminary results from this sampling effort are summarized below, with full results presented in Appendix G. Note that as of the time of this document's publication, the data have not yet been validated.

2009 SEDIMENT SAMPLING RESULTS							
	Sediment Concentrations (mg/kg)						
	SED-1	SED-1A	SED-2	SED-2A	SED-3-4*	SED-DSHP (July/August)	Cleanup Goal
Total PAHs	9.8	26.4	13.8	0.7	ND	21.3/ND	35
Total cPAHs	ND	ND	ND	ND	ND	2.1/ND	4
Phenanthrene	<1.4	4.1	1.4	<0.49	<0.41	0.57/ND	4

* Including duplicate sample results
ND = Not Detected
Source: Bollinger, 2009b

The concentrations presented for SED-1 and SED-2 are within the range of detected concentrations determined during the long-term monitoring. However, the current results are on the low end of the range, with neither SED-1 nor SED-2 having concentrations exceeding cleanup goals. It is not clear if this is a trend due to attenuation processes. Further sampling would be necessary to determine if a trend is occurring, or if the lower results are due simply to the heterogeneous nature of sediments.

Similar to historical results, concentrations at SED-3-4 and SED-DSHP are both either below detection limits or detected, but below cleanup goals. SED-2A, located outside of the remediation zone, did not show concentrations above cleanup goals. SED-1A, located further from shore than SED-1, but still within the remediation zone, showed a slight exceedance of the phenanthrene cleanup goal.

6.5 Site Inspection

A site inspection was conducted on July 7, 2009. The inspection commenced with an inspection of the groundwater treatment building that was attended by representatives from EPA, Beazer East, Inc., Town of Westborough, and the Westborough Community Land Trust. Some discussion occurred regarding possible use of the building by the Town and possible future passive recreation on portions of the site. Interviews with some attendees were also conducted during this portion of the inspection (refer to Section 6.6). James Malloy, Westborough Town Manager, followed up with a letter to EPA, included as Appendix H, which noted the Town's continued interest in using the treatment building for storage of town equipment.

Next, representatives from EPA, Beazer East, Inc., and M&E conducted a site walkover, an inspection of the on-site double-lined landfill, former lagoon area, Kettle Pond and other site features. A site inspection report, including site photographs and a list of attendees, is included in Appendix B.

The on-site landfill and former lagoon capped areas were well vegetated; no erosion or damage to the caps were noted. All monitoring wells that were observed appeared to be in good condition and secured with well locks. The piping from the in-situ bioremediation system in the Kettle Pond area remains in place. The treatment plant was not operating but all equipment remains in place and appears to be in good condition. The DNAPL recovery system continues to operate in a passive mode. Removal of DNAPL from the site currently requires multiple container transfers. This may be improved in the future through direct pumping into 55-gallon drums, followed by removal of the drums.

The shoreline of Hocomonco Pond was observed from the former boat ramp area, as was the rock-lined discharge channel for the relocated storm drain. Historic concrete structures (e.g., tank cradles, pads, and walls) were observed between the former lagoon area and Hocomonco Pond. Boaters/fisherman currently access the pond via a shoreline area near the water treatment plant gate. This area, which appears to be the only public access to the pond, was observed during the inspection and a well was located in the area, which appears to be a former water supply well.

The discharge stream from Hocomonco Pond flows though a culvert beneath Otis Street. Dense vegetation made it difficult to observe the inlet of the culvert on the west side of Otis Street. The representative from Beazer East, Inc. noted that excavation of the discharge stream extended up to 700 feet downstream from the culvert outlet located on the east side of Otis Street.

The northwestern, southern, and a portion of the eastern sides of the site, are secured by a chain link fence topped with barbed wire. Part of the eastern side and the northern side of the property are secured by a 5-foot high chain link fence. The fencing does not enclose the entire site boundary, just the areas of contamination. "No Trespassing" signs are posted on fencing around the site. There did not appear to be any evidence of vandalism and no reports of vandalism or trespassing were noted.

6.6 Interviews

Interviews with some site inspection attendees were conducted on July 7, 2009. Additional interviews were conducted through e-mail correspondence, via telephone, and during a technical meeting held on July 27, 2009. Information obtained during the interviews is summarized below. A list of individuals interviewed regarding this five-year review and records of the questions and responses are included in Appendix C.

Paul McNulty, Westborough Director of Public Health, indicated that he has not been aware of any complaints, violations, or incidents related to the site and he generally feels well informed about the site's activities and progress. Mr. McNulty stated that he would like to see fencing put around the landfill cap and former lagoon cap and at least a portion of the site turned over to the Town of Westborough for passive recreation.

Mike Bollinger, Beazer East, Inc., reported that monitoring data shows a stable groundwater plume and stable DNAPL area. He stated that the level of O&M has been relatively static over the past five years with no unexpected difficulties. O&M staff are typically on-site 1 to 2 days per week. Mr. Bollinger stated that he is currently exploring opportunities to optimize O&M with EPA with respect to collection and management of DNAPL. His expectation is that changes will maintain efficiency but reduce costs.

Rich Voutas, Assistant DPW Director, and Frank Desiata, Recreation Director, both for the Town of Westborough, were interviewed jointly. Both indicated that the site has been well maintained and that site operations are quiet and are not affecting the surrounding community. They are not aware of any incidents at the site. They would like to continue to see the Town kept in the loop with regard to decision making on the future of the site.

Don Burn, a resident of Westborough and Stewardship Chairman for the Westborough Community Land Trust, stated that overall the project is being done well. He would like to see the site known for passive, and potentially active, uses in the future. He has a concern regarding who will pay for what as the site gets shut down (e.g., fence removal, fence installation, loaming/seeding, etc.). He is not aware of any community concerns regarding the site. He noted that fishermen in the area appear to be catching and releasing, rather than consuming fish from the pond. He noted that there is sometimes dumping on the non-fenced portions of the property. For example, they once had to remove 70 tires. He feels well-informed about the site's activities and progress.

Derrick Golden, Remedial Project Manager for EPA and former RPM for the Hocomonco Pond site, provided written responses to interview questions. Mr. Golden still feels well informed about the site's activities and progress, through periodic communication with the current EPA RPM. Mr. Golden indicated that the site is in the final phase of the Superfund process, which includes DNAPL recovery, long-term monitoring and sampling, and maintenance of the landfill and lagoon caps. Effects of site operations on the surrounding community have been minimal. He stated that the Town of Westborough currently owns the property and the Town plans to preserve the property as open space for passive recreational uses (i.e., a walking trail). The

Town plans also include removing the perimeter site fence so access to the site is not restricted. Mr. Golden indicated that DNAPL recovery activities should continue in order to reduce DNAPL mass and source reduction and that reuse of the property into a passive recreational area would be beneficial to the Town and community.

Jay Naparstek, MassDEP project manager, has recently been involved with the project through site visits with EPA, generally associated with five-year reviews and site inspections, and feels well informed. He stated the project is going well, with the exception of issues associated with DNAPL and groundwater recovery. Mr. Naparstek indicated that there needs to be a better long-term monitoring plan and O&M plan and there also needs to be better information generated on approaches to DNAPL recovery and groundwater issues.

Steve Mangion, EPA hydrologist, stated that the project needs to implement additional measures for recovery of free-phase DNAPL and dissolved-phase contamination. In order to do so, he stated that additional site characterization is needed. Mr. Mangion does feel well informed about the site through working with the EPA/MassDEP project team.

Bart Hoskins, EPA ecological risk assessor, stated that the site is "stable" but that monitoring certainly needs to continue to make sure the site continues to be stable. He is aware that the Town would like to use the property and that decisions need to first be made by EPA before that can go forward. Past suggestions that he has made regarding the site's management or operation have been acted upon.

7.0 TECHNICAL ASSESSMENT

This section provides a technical assessment of the remedy implemented at the site, as outlined in the *Comprehensive Five-Year Review Guidance* (EPA, 2001). The assessment evaluated: whether the remedy is functioning in accordance with decision documents; whether exposure assumptions, toxicity values, cleanup levels, and RAOs have changed or been updated; and whether any other information exists that could affect the remedy's protectiveness. There were no ARARs and/or "to be considered" (TBCs) identified in the 1985 ROD since it was a pre-SARA ROD. Chemical-specific ARARs were identified in the SDD as part of the establishment of interim groundwater cleanup levels. Action-specific ARARs, including post-closure care O&M requirements, were identified during the remedial design process for the on-site double-lined landfill and former lagoon area cap.

7.1 Question A: Is the Remedy Functioning as Intended by the Decision Documents?

No. Interim groundwater cleanup levels for benzene and naphthalene have routinely been exceeded at wells MLC-2 and MLC-3, which are located outside of the TI zone.

Remedial Action Performance. The on-site landfill and former lagoon area cap are in good condition and are functioning as designed. They are covered by grasses; no erosion was noted. Annual groundwater monitoring around the landfill has shown few detections of PAHs. Monitoring around the former lagoon area has detected naphthalene at three of the four wells. Benzene and naphthalene concentrations at well MLC-2 and MLC-3, outside the former lagoon TI zone, have routinely exceeded their respective interim groundwater cleanup levels.

The monitoring program established to ensure plume containment within the identified TI zones is ongoing, as is DNAPL recovery. Through May 2009, approximately 60,452 gallons of DNAPL have been recovered (Arcadis, 2009c). A significantly larger volume of DNAPL was recovered during operation of the system in enhanced/passive mode, stopped in May 2003, than in the passive only mode. While the 2002 DNAPL recovery evaluation and pump tests indicated that the volume of DNAPL recovered at the optimal pumping rates established in 1998 had declined over time (BBL, 2003), further review of the data, inclusive of data through May 2003 does not appear to show any obvious decline over time. The 2002 evaluation confirmed an increase in the ratio of gallons of groundwater pumped to recover one gallon of DNAPL. The results of the series of stepped pumping tests conducted as part of the 2002 DNAPL recovery evaluation indicated that the increase in system efficiency was negligible at pumping rates above 6 gpm for DRW-1 and 4 gpm for DRW-2 (BBL, 2003). For the most part, DNAPL continues to be detected, and recovered, in the same group of wells where it has historically been found. However, DNAPL was detected for the first time in November 2006 at four wells (BRW-1, BRW-2, BRW-3, and A-8) located between the Kettle Pond area and Hocomonco Pond, within the TI zone. The DNAPL thickness measured in the wells in the Kettle Pond TI zone, where DNAPL is consistently detected, has varied over the 8-year period for which data are available. No consistent trend of increasing, or decreasing, thickness was measured between November 2000 and November 2008. The greatest thickness recorded in five of the wells was measured in May 2003; three of the wells measured in the most current monitoring round (November 2008) showed their greatest DNAPL thickness.

The LTM data indicate that groundwater within the TI zones remains at generally stable concentrations, with decreasing concentrations in a few locations. Groundwater concentrations at two of the monitoring wells (MLC-2 and MLC-3), outside the former lagoon TI zone, consistently exceed the interim groundwater cleanup standards for benzene and/or naphthalene. The two monitoring wells (M-15S, M-15D) inside the Kettle Pond TI zone show varying trends in concentrations. Benzene and naphthalene concentrations in the two wells exceed the respective interim groundwater cleanup standards. The detection limit for benzo(a) pyrene is not low enough to confirm that the IGCL has been achieved outside the TI zones.

PAH and phenanthrene concentrations in sediments sampled as part of the LTMP varied over the 7-year monitoring period (1998 – 2005). Concentrations at one of the two stations located within the Kettle Pond TI zone (SED-1) have exceeded the ecological sediment cleanup levels, indicating an apparent impact of the groundwater discharge from the Kettle Pond area to Hocomonco Pond. The concentrations are generally stable or decreasing and are comparable to the December 1998 sediment concentrations. Based on the available results for 1998 through 2005, it is not clear if the human health sediment cleanup level was exceeded. The human health sediment cleanup level is based on total carcinogenic PAHs and is not readily comparable to the available total PAH results. However, based on recent sediment sampling conducted in 2009, there were no exceedances of the human health sediment cleanup level.

Since the stoppage of enhanced DNAPL recovery, groundwater elevation monitoring has shown that hydraulic containment no longer exists. Based on the data collected to date in accordance with the LTMP, it is not clear if the areal extent of the DNAPL and its associated dissolved-phase plume is contained.

System Operations/O&M. As described in Section 4.4, annual site costs over the past five years have been higher than the ROD estimate for O&M activities; however, the modifications to the ROD-selected remedies specified in the 1992 ESD and 1999 ESD have changed the groundwater RAO from plume restoration to plume containment. This resulted in establishment of the LTMP and a monitoring program different from that envisioned in the ROD. No cost estimate for the LTMP was available. The O&M activities for the landfill and former lagoon area, as well as the LTMP, continue to be implemented as required.

Opportunities for Optimization. The use of enhanced DNAPL recovery, which was discontinued in 2003, has been shown to remove significantly larger volumes of DNAPL than the passive recovery mode. However, opportunities for optimization of the current passive DNAPL recovery mode certainly exist and should be investigated to allow for greater DNAPL recovery rates. Items that should be considered include:

- installation of new recovery wells at locations where significant DNAPL is likely to exist, such as within the former Kettle Pond;
- replacement of wells with screen elevations that are unlikely to coincide with DNAPL zones; and
- replacement of wells with PVC well screens, since PVC can swell and cause the screen slots to close up preventing DNAPL entry into the well.

As part of well replacement, consideration should be given to use of larger diameter wells to enhance DNAPL recovery.

Indicators of Remedy Problems. No significant problems with the remedies in place or the on-going O&M activities were identified during this five-year review. Data collected to date indicate that groundwater concentrations are generally stable. However, it is unclear if the areal extent of the DNAPL and its associated dissolved-phase plume is contained.

Sediment data show historical exceedances of the cleanup level at station SED-1. This station is located within the Kettle Pond TI zone. Exceedances of the interim groundwater cleanup levels are consistently seen at monitoring wells MLC-2 and MLC-3, which are located just outside the former lagoon area TI zone. In accordance with the process described in the LTMP, the exceedances in both groundwater and sediment will require further evaluation. The decision tree used in the LTMP was developed to allow for flexibility in evaluating the monitoring data and considering what follow up actions, if any, are required. According to the decision tree, professional judgment would be used to determine whether additional remediation is warranted (Golden, 2004).

Implementation of Institutional Controls. As noted in Section 4.3.9, the ROD and 1999 ESD both require institutional controls in the form of deed restrictions. These deed restrictions, to restrict development in the area of the former lagoon, landfill, and along the embankment of Otis Street, and to prohibit extraction of the groundwater for purposes other than the remedial action unless certain conditions are met, have been prepared in draft form but have not yet been finalized and recorded. There are no known potable wells located within the impacted, or immediate downgradient, portions of site aquifer. The fencing around the remediated areas of contamination is in good condition and appears to adequately control access to the areas. Consequently, all known routes of exposure are currently under control.

7.2 Question B: Are the Exposure Assumptions, Toxicity Data, Cleanup Levels and Remedial Action Objectives (RAOs) used at the Time of Remedy Selection Still Valid?

Yes. Exposure assumptions and available toxicity information used at the time of remedy selection are still valid. Subsequent changes in toxicity values and risk assessment methods have occurred since remedy selection; however, these changes do not impact the protectiveness of the remedy.

Changes in Standards and TBCs. Since the 1985 ROD was a pre-SARA ROD, no detailed listing or analysis of applicable or relevant and appropriate requirements was included. The 2004 Five-Year Review report provided an ARARs evaluation. This Five-Year Review focuses on ARAR changes since the 2004 Five-Year Review. For the purposes of this review and compliance with current requirements, tables of action-, location-, and chemical-specific ARARs are included in Appendix E of this report.

The action-specific ARARs applicable to the landfill and former lagoon area covering post-closure care have not changed. The federal RCRA regulations in 40 CFR Part 264 (§264.310) and the companion state regulations in 310 CMR 30.633 remain applicable to long-term post-closure care and groundwater monitoring. Since the interim cleanup levels were established for groundwater, the MCL for arsenic was lowered from 50 ug/L to 10 ug/L. Arsenic was not included in the long-term monitoring program or the more recent annual monitoring around the former lagoon and landfill caps; therefore, the impact of the MCL changes can not be assessed. The interim cleanup levels for ethylbenzene, toluene, xylenes (total), and chromium (total) now represent the final MCLs for each compound, rather than the final MCLGs which were in place when the SDD was completed in 1992. Consistent with the NCP, non-zero MCLGs are an appropriate reference for cleanup goals. In most – but not all- cases, the MCL and MCLG are equal. The reference to MCLGs should be retained where the MCLG is not zero.

The 2004 Five-Year Review report suggested that MCP Method 1 GW-1 standards are applicable for the Hocomonco Pond site. However, site-specific risk-based cleanup goals established in the SDD, along with the Massachusetts MCLs, provide the protectiveness necessary at the site. MCP Method 1 GW-1 standards would be appropriate for use in lieu of detailed risk evaluation, which was performed in the SDD. Therefore, the MCP Method 1 GW-1 standards are not considered as chemical-specific ARARs. However, the standards are useful for evaluation/comparison purposes with respect to analytes where IGCLs were not developed in the SDD. Further discussion of analytes without IGCLs is presented later in this section.

<u>Changes in Exposure Pathways.</u> The zoning of the area around the site has remained as general industrial. In the previous five-year review, it was noted that the Town of Westborough was considering a change to the zoning ordinance and addition of a village townhouse overlay district. Should this change be implemented, village townhouses would be allowed in an area west of the site. However, there was no mention of this change during interviews on the date of the site inspection. The town also plans to reuse the site for passive recreation after all site cleanup activities are completed. The Westborough Master Plan defines passive recreation as "activities done in a natural setting with little or no facility development. These activities include hiking, biking, boating, and bird watching" (Daylor, 2003). Passive recreation uses would not result in any new exposure pathways that could affect the protectiveness of the remedy.

Exposure pathways evaluated in 1992 included fish ingestion and surface water exposure. These pathways did not show risk/hazards above the EPA risk range or a hazard index of 1 at that time (Keystone, 1992a). As the remedy removed source material, current results are not expected to have increased, even with revisions to dermal calculation methods which have occurred since the 1992 evaluation. However, if recontamination of sediment occurs at concentrations greater than pre-remedial actions, a re-evaluation may be necessary.

The excavation and dredging actions and subsequent disposal of the contaminated materials in the on-site double-lined landfill or within the former lagoon area cap originally eliminated the direct contact, ingestion, and inhalation exposure pathways that were evaluated for human health risks in the SDD. Once the required deed restrictions are in place, any future exposure to materials beneath the caps will be prevented, as will potential exposure via ingestion of groundwater. However, historical monitoring of sediments suggests that groundwater discharge of contaminants may have resulted in exceedences of sediment cleanup levels set by EPA to be protective of human direct exposure. Sediment sampling results from 2009 did not show an exceedance of the human health cleanup goal. However, the data set is not fully consistent with historical data, as the concentrations were at the low end of the historical range. It is not clear if this is due to attenuation or simply due to the heterogeneous nature of sediments. Regardless, based on the 2009 sediment sampling, there does not appear to be evidence of current significant risk to human receptors.

One pathway of potential concern that was not evaluated in the previous risk assessments was the vapor intrusion pathway. This pathway may be of concern at sites where soil and shallow groundwater contaminated with VOCs exists in close proximity to occupied buildings. Except for the groundwater treatment plant building, there are no buildings located above the groundwater plume that could contain concentrations of VOCs above vapor intrusion groundwater screening values. The treatment building is only occasionally occupied for short periods of time. However, should shallow groundwater VOC contamination continue to exist coincident with future site development involving more significant use of the treatment building or the construction of buildings that will be occupied consistently (e.g., office space), the vapor intrusion pathway should be further evaluated to determine the potential risk to on-site workers.

Exposure pathways for ecological receptors included potential exposure in shallow sediments of Hocomonco Pond and the Kettle Pond area. Future exposures in the Kettle Pond area were eliminated based on the remedy involving excavation of contaminated soil/waste and on-site disposal into a double-lined landfill. Removal of the shallow sediment of the eastern portion of Hocomonco Pond and discharge stream was completed to remove potential exposure of aquatic organisms. However, a DNAPL source remains at depth and monitoring of sediments suggests that groundwater discharge of contaminants may have resulted in exceedances of cleanup levels set by EPA for shallow sediments in the pond, further indicating that an exposure pathway to aquatic organisms may still be present. Although an exposure pathway may still be present and data suggest groundwater discharge may present a continuing source, sediment toxicity testing performed in 2002 concluded that no unacceptable impacts to aquatic organisms existed at that time (AMEC, 2003).

Changes in Toxicity and Other Contaminant Characteristics. In the development of the soil and sediment cleanup levels, all PAHs were considered to be equal in toxicity to the most toxic, benzo(a)pyrene. Since the development of these levels, EPA has approved a relative potency method for evaluating risks to carcinogenic PAHs whereby each individual cPAH is evaluated using the toxicity value for benzo(a)pyrene in combination with a comparative relative potency factor. Among the other cPAHs, only dibenzo(a,h)anthracene is considered equal in toxicity to benzo(a)pyrene. All other cPAHs are considered less toxic. Since the cleanup levels were developed using the benzo(a)pyrene toxicity factor for all cPAHs without the relative potency factors, the levels are more protective than they would be if they were re-calculated today.

Risk-based interim groundwater cleanup levels were calculated for noncarcinogenic PAHs. Toxicity values used in the calculation of groundwater cleanup levels (RfDs and CSFs) remain unchanged with the exception of the RfD for naphthalene, which has decreased by 50 percent (historical – 4×10^{-2} mg/kg-day; current – 2×10^{-2} mg/kg-day). For this reason, if the groundwater cleanup level for naphthalene was recalculated today, it would decrease to 750 µg/L from the existing cleanup level of 1,500 µg/L. Note also that current methods would utilize the naphthalene RfD as a surrogate for other non-carcinogenic PAHs which do not have RfDs (e.g., acenaphthylene, benzo(g,h,i)perylene, and phenanthrene). The cleanup levels for these analytes would then be the same as naphthalene. Based on a review of the available groundwater monitoring data, application of the revised RfD would not impact the current determination of protectiveness with respect to groundwater.

2-Methylnaphthalene is a non-carcinogenic PAH which has historically not been reported as part of the analytical methods used at the site. Recent reporting has shown detections of this analyte. Using a current RfD of 4×10^{-3} mg/kg-day, the cleanup goal for 2-methylnaphthalene would be one-tenth of the historical naphthalene cleanup level (150 µg/L). The detected results presented in Table D-1 are all below this concentration.

Changes in Risk Assessment Methods. Soil and sediment cleanup levels for human health were developed for total cPAHs assuming adult and child recreational exposures to soil and sediment through ingestion and dermal contact. Contact was assumed to occur 24 days per year during summer months at most locations within the site. For the area of the discharge stream, contact was assumed to occur 12 days per year. The selected cleanup levels correspond to cancer risk levels of 10^{-6}. The assumptions used in developing these cleanup goals remain reasonable.

Sediment cleanup levels for protection of aquatic life were developed for total PAHs and phenanthrene. Three different methods were used to develop the ecological cleanup levels, with the average of the three methods selected as the final level. Since the ecological cleanup level for total PAHs is greater than the human health level for total PAHs, the cleanup level used for shallow sediments (0 to 2 feet) was the more stringent human health-based cleanup level. The sediment cleanup level for phenanthrene of 4 mg/kg was established by EPA (1992) based on site-specific sediment organic carbon concentrations using three methods. The cleanup levels established by EPA, adjusted for site-specific organic carbon concentrations in the SDD, are reasonably-based and adequately protective levels.

Groundwater cleanup levels for human health were developed based on the assumption that groundwater could be used as a drinking water source. The selected cleanup levels correspond to cancer risk levels of 10^{-6} and Hazard Quotients of 1.0, consistent with current EPA guidelines. Exposure assumptions were consistent with the assumptions that are still accepted today for drinking water scenarios. Subsequent to when groundwater cleanup levels were established in the SDD, dermal absorption and inhalation of volatile contaminants were incorporated into the development of risk-based groundwater cleanup levels, rather than ingestion alone. The impact of this change is minor for most of the PAHs which required development of risk-based cleanup goals, because they are not volatile and are not adsorbed significantly. Naphthalene, however, is volatile and would include consideration of the inhalation pathway during potable water use (e.g., showering/bathing) if cleanup goals were currently developed. Consideration of this pathway could reduce the cleanup goal to below 10 μg/L, depending on the exposure parameters utilized for that scenario. As there are no current exposure pathways to the groundwater, the protectiveness of the remedy is not currently impacted by this change. However, further evaluation of appropriate groundwater cleanup goals should be performed to ensure future remedy protectiveness.

Subsequent to the SDD, a new method to evaluate compounds with mutagenic modes of action, such as the carcinogenic PAHs, is now recommended by EPA. The current methodology calls for the use of age-specific adjustment factors to account for an increased sensitivity during early life. This supplemental early-life calculation was not performed as part of the SDD evaluation since the EPA carcinogen risk assessment guidance was published subsequent to the completion of the site-specific risk evaluation. Based on the data available for this five-year review, the early-life calculation would not be expected to change risk conclusions at the site with respect to what would require remediation. Risk calculated for the media/exposure areas which were not remediated were all below the EPA cancer risk range of 10^{-6} to 10^{-4}. The early-life calculation utilizes age-dependent adjustment factors (ADAFs) which would, at most, increase the risk 10-fold (for a child 0-2 years old) and would generally increase the risk due to cPAHs at the site by a factor of 3 (the ADAF for ages 2 to 16 is 3 and the site child evaluated was ages 6 to 18). Either of these increases results in risks remaining within or below the EPA cancer risk range of 10^{-6} to 10^{-4}. Conservatively using the ADAF of 3 for cPAHs, the sediment cleanup goal in Hocomonco Pond would be reduced to approximately 1.3 mg/kg.

<u>Expected Progress Towards Meeting RAOs.</u> The portions of the remedy involving excavation and dredging of contaminated soils and sediments, and placement in the on-site double-lined landfill or the capped former lagoon area, have met the RAOs described in the ROD for the areas of contamination. The RAO for groundwater was changed by the 1999 ESD and TI waiver from groundwater restoration to plume containment in the identified TI zones. The on-going long-term monitoring program was developed at the agencies' request to demonstrate that the plume containment remedy is protective of human health and the environment. The evaluation of the LTM data after 5 years outlined in the LTMP was designed to assess trends in concentrations of individual constituents. Based on the LTM data and other data collected since that time, it is not clear if the DNAPL and its associated dissolved-phase plume is contained. There is historical evidence of potential recontamination of sediment in Hocomonco Pond which

could negate previous remediation work performed there. Sediment sampling results from 2009 did not show an exceedance of the human health cleanup goal. However, the data set is not fully consistent with historical data.

Long-term monitoring of sediments in Hocomonco Pond indicates some exceedances of PAH cleanup levels. However, biological monitoring indicated no significant toxicity associated with these levels (AMEC, 2003). The LTMP states that if the concentration of PAHs exceed the cleanup levels set in the SDD by EPA, and monitoring indicates increasing trends in sediment PAH levels, additional biological monitoring may be recommended.

7.3 Question C: Has Any Other Information Come to Light that Could Call into Question the Protectiveness of the Remedy?

No. There is no new information identified through this review which would call into question the protectiveness of the remedy for known potential human health and ecological receptors.

No other information has been identified during completion of this five-year review that could affect the protectiveness of the remedy. There have been no reports of flooding in the low-lying portions of the site. No new ecological risks have been identified. Additional benthic invertebrate community monitoring will be performed if warranted based on the decision tree process outlined in the LTMP.

7.4 Technical Assessment Summary

The landfill and former lagoon area caps are in good condition and are functioning as designed. The monitoring established to ensure plume containment within the identified TI zones is ongoing, as is DNAPL recovery. Based on the available data, it is not clear if the DNAPL plume is contained. The dissolved-phase plume is clearly not contained based on groundwater contour maps produced since groundwater pumping ceased in 2003, and while there is no current evidence of negative impacts to human or ecological receptors, groundwater to surface water relationships require further characterization. In addition, the required deed restrictions are not yet in place; however, there is no evidence of trespassing at the site

There have been no changes to ARARs or other applicable standards identified in the SDD and design documents, other than the lowering of the MCL for arsenic from 50 ug/L to 10 ug/L.

There have been no land use changes or changes to exposure pathways. EPA has approved a relative potency method for evaluating risks to cPAHs whereby each individual cPAH is evaluated using the toxicity value for benzo(a)pyrene in combination with a comparative relative potency factor. All individual cPAHs are considered less toxic or equal in toxicity to benzo(a)pyrene. Since the cleanup levels were developed using the benzo(a)pyrene toxicity factor for all cPAHs without the relative potency factors, the levels are more protective than they would be if they were re-calculated today. However, use of ADAFs for early-life calculations associated with mutagenic compounds would lower the sediment cleanup goal approximately 3-fold. Sediment sampling results from 2009 did not show an exceedance of the human health cleanup goal. However, the data set is not fully consistent with historical data.

The RfD for naphthalene has decreased by 50 percent. If the groundwater cleanup level for naphthalene was recalculated today, it would decrease to 750 µg/L from the current cleanup level of 1,500 µg/L. Furthermore, inclusion of the dermal adsorption and inhalation pathways could decrease the groundwater cleanup level for naphthalene to below 10 µg/L.

Review of the monitoring data downgradient from the Former Lagoon Area showed consistent exceedances of the IGCLs. Further characterization of the downgradient plume extents is needed. There are no known potable wells immediately downgradient of the plume.

8.0 ISSUES

This section provides a summary of the issues identified during this five-year review. Recommendations and follow-up actions are presented in Section 9.0.

Issue	Affects Protectiveness? (Y/N)	
	Current	Future
The required deed restrictions are not yet in place. The documents have been drafted and are under review with the state and the EPA.	N	Y
Monitoring well MLC-2 and MLC-3 groundwater concentrations exceed interim groundwater cleanup levels for benzene and/or naphthalene. Since the RfD for naphthalene has decreased by 50 percent, the groundwater from MLC-2 and MLC-3 would exceed a recalculated naphthalene interim cleanup level by a larger amount. These wells are located immediately downgradient and outside of the former lagoon area TI zone. Recalculation of a naphthalene cleanup level which includes the inhalation pathway could result in many other site wells exceeding the groundwater cleanup level.	N	Y
The current analytical reporting limits for all cPAHs for which there are GW-1 standards and/or MCLs, are higher than federal or state standards. Therefore it is not possible to assess whether groundwater from any of the four landfill monitoring wells, the four former lagoon area monitoring wells, or the monitoring wells included in the LTMP meets the MCL or GW-1 standard for each cPAH. GW-1 standards are not considered an ARAR, but are useful for evaluation purposes for those PAH compounds where IGCLs were not developed.	N	Y
IGCLs were established in the SDD for arsenic and chromium; however, the long-term monitoring and annual groundwater sampling around the former lagoon area and landfill do not include analysis for arsenic or chromium. Periodic groundwater sampling for arsenic and chromium should be performed to evaluate compliance with the IGCLs outside of the TI zones.	N	Y

Issue	Affects Protectiveness? (Y/N)	
	Current	Future
Hydraulic containment of the groundwater within the TI Waiver Zones was required by the 1999 ESD. Since the stoppage of enhanced DNAPL recovery in 2003, groundwater elevation monitoring has shown that hydraulic containment no longer exists (see groundwater contour maps in Appendix F). Thus, the dissolved phase plume is not contained. Based on the data collected to date in accordance with the LTMP, it is not clear if the areal extent of the DNAPL is contained. Historical sediment monitoring data suggests that groundwater discharge of contaminants may have resulted in sediment cleanup level exceedances and that an exposure pathway may still be present, which requires further evaluation. Some indicators that the DNAPL plume may not be stable include the 2006 detections of DNAPL at several wells between the Kettle Pond and Hocomonco Pond where DNAPL had not previously been detected. Further studies and evaluation are needed to define the extent of the DNAPL and dissolved-phase plume and to determine whether discharge of contaminants to Hocomonco Pond is occurring at levels or locations which may result in unacceptable exposure to human or ecological receptors. In conjunction with the above evaluation, opportunities for optimization of the DNAPL recovery system, which is on-going, should be evaluated. Items such as well placement, well screen elevation, well construction, and application of newer technologies should be considered.	N	Y
Current site monitoring activities differ from the existing LTMP. A current site monitoring and operations plan does not exist. An updated plan should be prepared that is inclusive of all components of current site operations.	N	Y

9.0 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

The following is a summary of recommendations and follow-up actions that are proposed for the site.

Issue	Recommendations/ Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness? (Y/N)	
					Current	Future
Deed restrictions are not in place	Finalize draft documents and record the deed restrictions	PRP/MassDEP	EPA	Sept. 2010	N	Y
Groundwater cleanup levels exceeded at wells MLC-2 and MLC-3, outside the former lagoon TI zone	Increase frequency of sampling MLC-2 and MLC-3 from annual; evaluate the extent of cleanup level exceedances and need for additional actions to achieve compliance	PRP	EPA/MassDEP	Sept. 2010	N	Y
Analytical reporting limit for cPAHs is too high	Use SIMs analytical method for PAHs to achieve lower reporting limits	PRP	EPA/ MassDEP	Prior to fall 2009 groundwater sampling event	N	Y
Arsenic and chromium data are not available for comparison to IGCLs	Conduct periodic groundwater sampling for arsenic and chromium at site monitoring wells	PRP	EPA/MassDEP	Part of fall 2009 groundwater sampling event	N	Y
Dissolved-phase plume not contained	Perform additional studies to determine plume extent, discharge location, and presence of a significant exposure pathway	PRP	EPA/ MassDEP	Sept. 2010	N	Y
DNAPL plume may not be contained	Perform additional studies to determine plume extent, and evaluate opportunities for optimization of DNAPL recovery	PRP	EPA/MassDEP	Sept. 2010	N	Y
An accurate, up-to-date site monitoring and operations plan does not exist	Prepare an updated site monitoring and operations plan	PRP	EPA/ MassDEP	Sept. 2010	N	Y

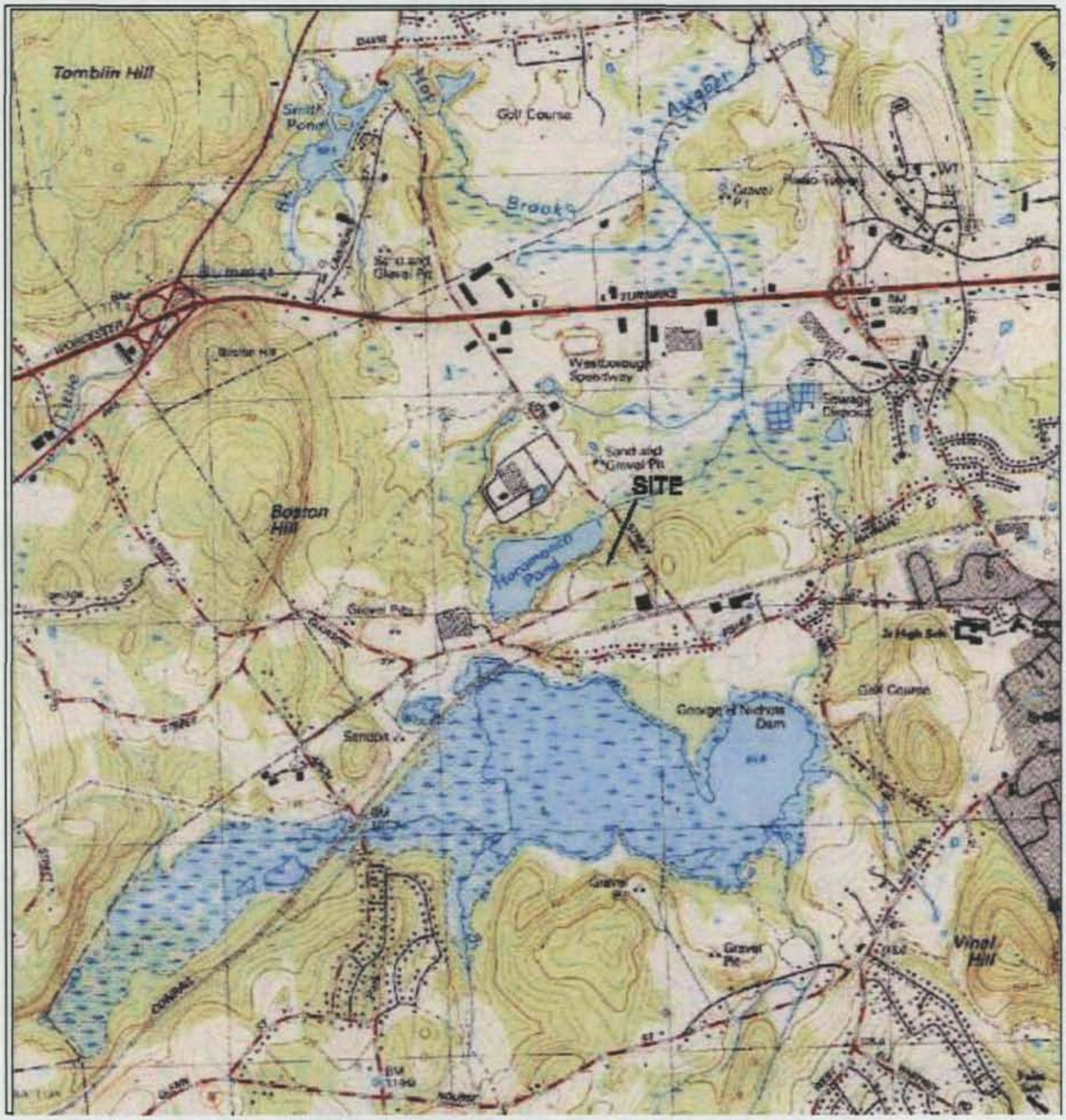
10.0 PROTECTIVENESS STATEMENT

The remedy currently protects human health and the environment because physical access to the site is restricted and there are no potable wells in use. However, in order for the remedy to be protective in the long-term, the following actions need to be taken; deed restrictions need to be finalized and recorded, and the studies and evaluations referenced in Section 9.0 will be completed to ensure long-term protectiveness.

11.0 NEXT REVIEW

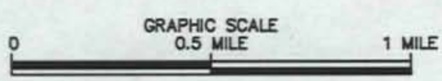
A third five-year review for the Hocomonco Pond site will be conducted in 2014.

FIGURES

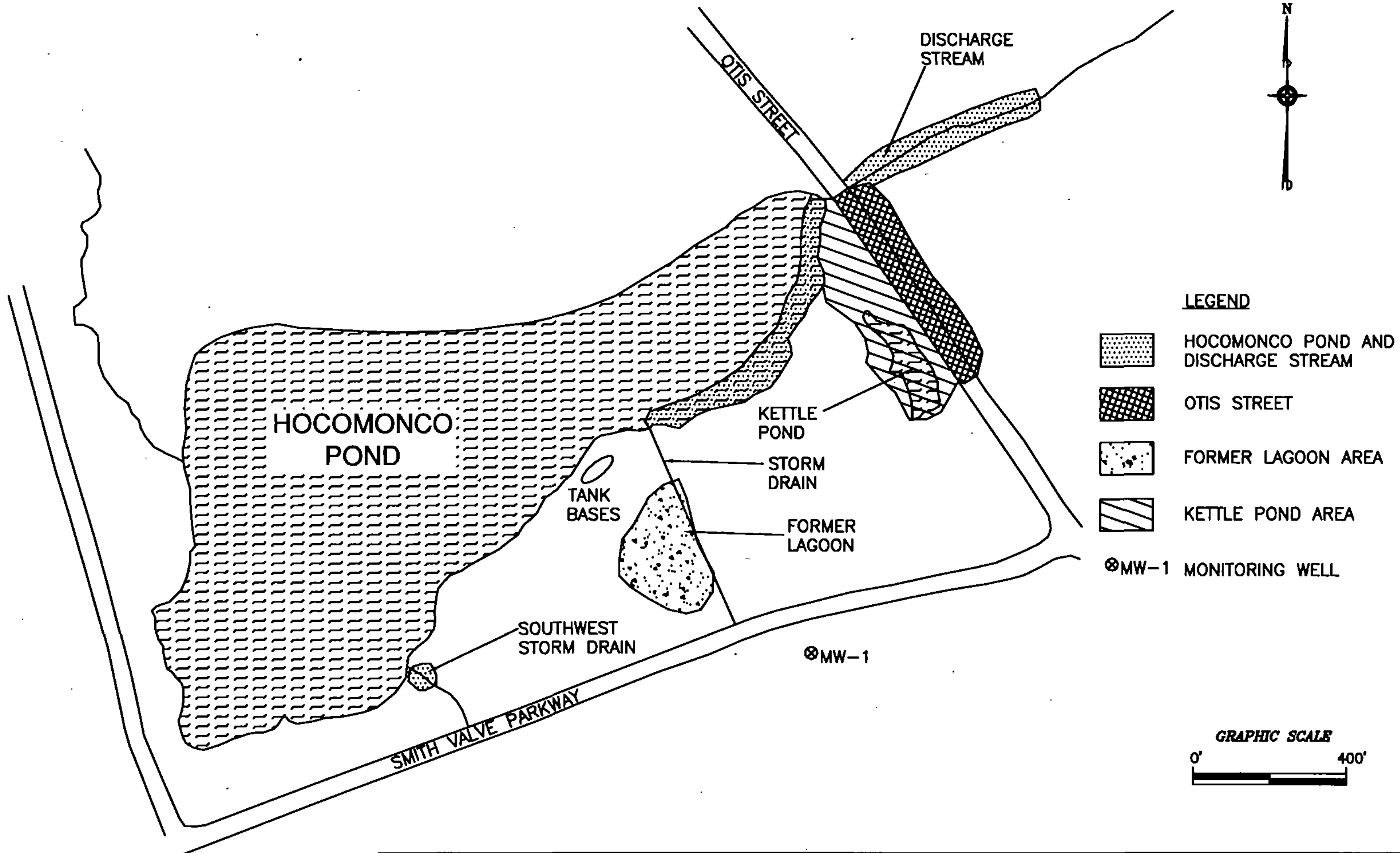


BASE MAP FROM USGS QUADRANGLE SHEET: MARLBOROUGH, MASS., 1983

QUADRANGLE LOCATION



SITE LOCUS				FIGURE 3-1
HOCOMONCO POND SITE - FIVE-YEAR REVIEW				TETRA TECH NUS, INC.
WESTBOROUGH, MASSACHUSETTS				
DRAWN BY:	D.W. MACDOUGALL	REV.:	0	
CHECKED BY:	P. CALL	DATE:	JULY 15, 2004	55 Jonspin Road Wilmington, MA 01887
SCALE:	AS SHOWN	ACAD NAME:	DWG\1845\0600\FIG_1.DWG	(978)658-7899



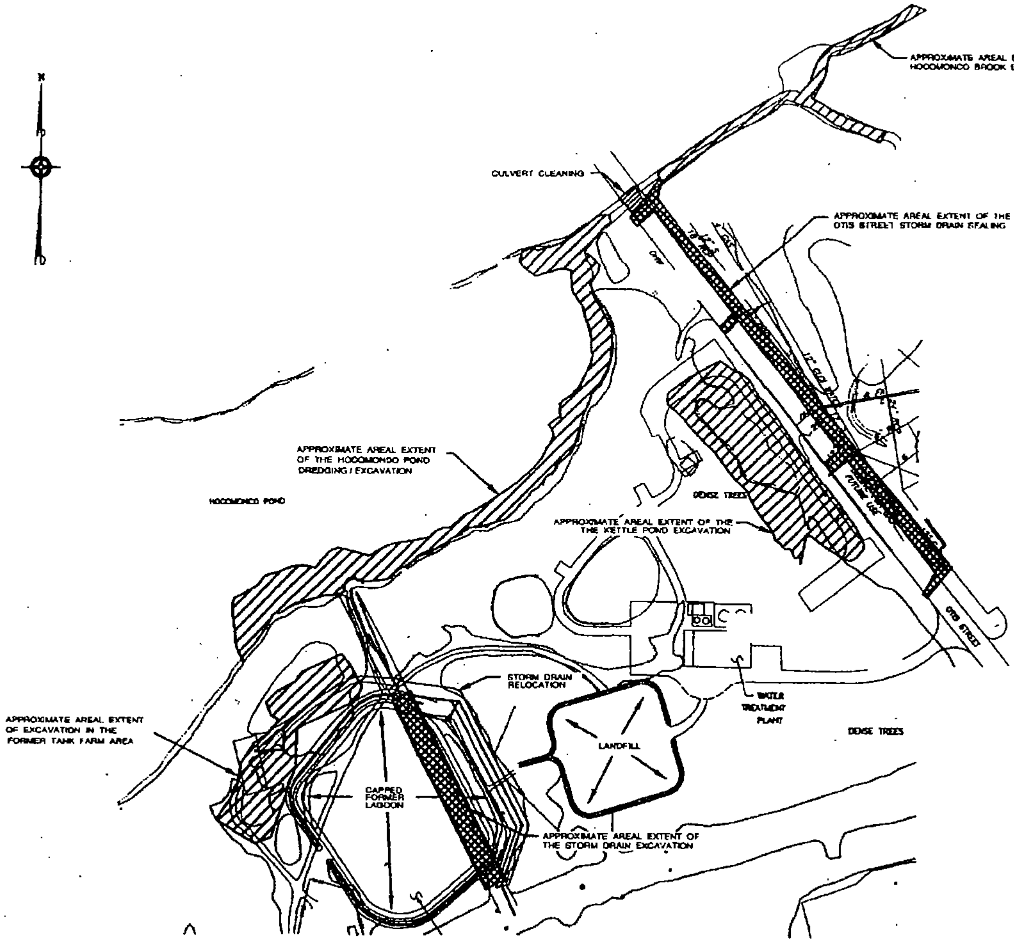
SOURCE:
HOCOMONCO POND SUPERFUND SITE,
'SUMMARY OF SITE CONTAMINATION AREAS',
CDM FEDEREAL PROGRAMS CORPORATION.

SITE CONTAMINATION AREAS			
HOCOMONCO POND SITE – FIVE-YEAR REVIEW			
WESTBOROUGH, MASSACHUSETTS			
DRAWN BY:	D.W. MACDOUGALL	REV.:	0
CHECKED BY:	P. CALL	DATE:	AUGUST 3, 2004
SCALE:	AS SHOWN	FILE NO.:	DWG\1845\0600\FIG_3-2.DWG

FIGURE 3-2

TETRA TECH NUS, INC.

55 Jonspin Road Wilmington, MA 01887
(978)658-7899



LEGEND

APPROXIMATE AREAL EXTENT OF SOIL OR SEDIMENT REMOVAL

APPROXIMATE AREAL EXTENT OF STORM DRAIN SEALING

NOTES:

1. SOURCE OF DRAWING FROM A PLAN BY FLUOR DANIEL GTI, EAST PITTSBURGH, PA, ENTITLED: "APPROXIMATE EXTENT OF REMOVAL ACTIVITIES AND LOCATION OF THE FORMER LAGOON CAP AND LANDFILL", DATED: 3/12/98, FIGURE 3-6, NO REVISION DATE.
2. ALL LOCATIONS TO BE CONSIDERED APPROXIMATE.
3. PLAN NOT INTENDED FOR DESIGN OR CONSTRUCTION.

APPROXIMATE EXTENT OF REMOVAL ACTIVITIES AND LOCATION OF THE FORMER LAGOON CAP AND LANDFILL

HOCOMONCO POND SITE — FIVE-YEAR REVIEW

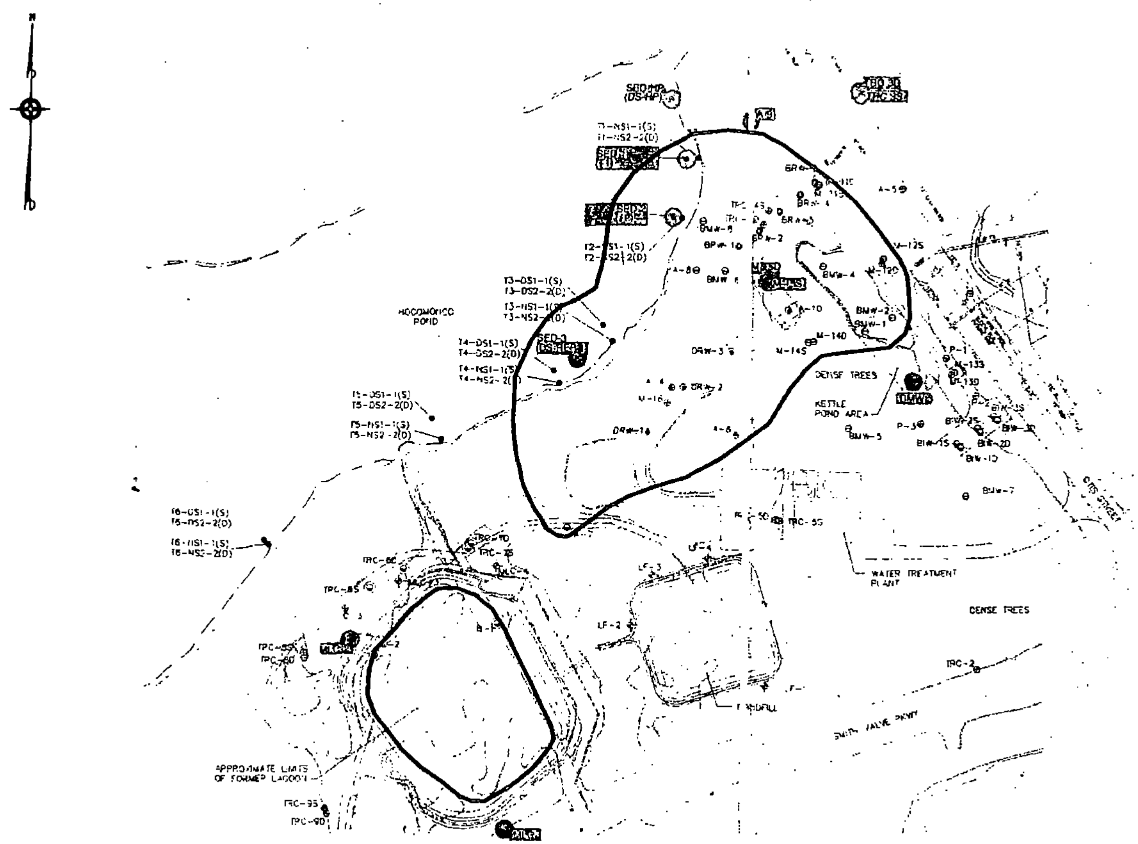
WESTBOROUGH, MASSACHUSETTS

DRAWN BY:	R.G. DEWSNAP	REV.:	0
CHECKED BY:	P. CALL	DATE:	AUG. 25, 2004
SCALE:	NONE	FILE NO.:	\DWG\1845\0600\FIG_4-1.DWG

FIGURE 4-1

TETRA TECH NUS, INC.

55 Jonspin Road Wilmington, MA 01887
(978)658-7899



LEGEND

BMW-4	BMW-MONITORING WELL
DRW-1	DRW-RECOVERY WELL
BIW-2S	BIW-INJECTION WELL
BRW-4	BRT-RECOVERY WELL
M-12D	M-MONITORING WELL
MLC-4	LF OR MLC LAGOON CAP OR LANDFILL MONITORING WELL
TRC-70	ABANDONED WELL
T2-NS2-2(D)	SAMPLING LOCATION
	POINT TO BE SAMPLED BY LONG-TERM MONITORING
	HORIZONTAL EXTENT OF THE TI ZONE

NOTES:

1. SOURCE OF DRAWING FROM A PLAN BY BBL ENTITLED "BEAZER EAST, INC., CLIENT LOCATION, HOCOMONCO POND, MONITORING WELL AND SAMPLE LOCATIONS", FIGURE 3, NOT DATED, ORIGINAL SCALE (AS MEASURED ON DRAWING): 1"=120'; NOTE ON DRAWING STATES THAT "THIS FIGURE BASED ON A DRAWING FROM FLUOR DANIEL GTI, FILE NUMBER 98182681.DWG DATED 3/19/98"
2. HORIZONTAL EXTENT OF THE TI ZONE DIGITIZED FROM PLAN BY BBL ENTITLED: "BEAZER EAST, INC., CLIENT LOCATION, HOCOMONCO POND, HORIZONTAL EXTENT OF THE TI ZONE", FIGURE 1.
3. ALL LOCATIONS TO BE CONSIDERED APPROXIMATE.
4. PLAN NOT INTENDED FOR DESIGN OR CONSTRUCTION.

MONITORING WELL AND SAMPLE LOCATIONS
HOCOMONCO POND SITE – FIVE-YEAR REVIEW
WESTBOROUGH, MASSACHUSETTS

DRAWN BY:	R.G. DEWSNAP	REV.:	0
CHECKED BY:	P. CALL	DATE:	AUG. 25, 2004
SCALE:	NONE	FILE NO.:	\DWG\1845\0800\FIG_4-2.DWG

FIGURE 4-2

TETRA TECH NUS, INC.
55 Jonspin Road Wilmington, MA 01887
(978)658-7899

APPENDIX A

DOCUMENT REVIEW LIST/REFERENCES

DOCUMENTS REVIEWED/REFERENCES CITED

AMEC, 2003. *Baseline Biological Monitoring Report, Hocomonco Pond, Westborough, Massachusetts.* AMEC Earth & Environmental. March 24, 2003.

Anderson, 2004. Email correspondence between Robert Anderson, BBL and Phoebe Call, TtNUS, August 5, 2004.

Arcadis, 2008a. *Monthly Status Report for September 2008, Hocomonco Pond Site, Westborough, Massachusetts. Letter from R. Anderson, Arcadis, to J. DiLorenzo, EPA and J. Naparstek, MassDEP.* Arcadis U.S., Inc. October 15, 2008.

Arcadis, 2008b. *Monthly Status Report for October 2008, Hocomonco Pond Site, Westborough, Massachusetts. Letter from R. Anderson, Arcadis, to J. DiLorenzo, EPA and J. Naparstek, MassDEP.* Arcadis U.S., Inc. November 17, 2008.

Arcadis, 2008c. *Monthly Status Report for November 2008, Hocomonco Pond Site, Westborough, Massachusetts. Letter from R. Anderson, Arcadis, to J. DiLorenzo, EPA and J. Naparstek, MassDEP.* Arcadis U.S., Inc. December 12, 2008.

Arcadis, 2009a. *Monthly Status Report for December 2008, Hocomonco Pond Site, Westborough, Massachusetts. Letter from R. Anderson, Arcadis, to J. DiLorenzo, EPA and J. Naparstek, MassDEP.* Arcadis U.S., Inc. January 15, 2009.

Arcadis, 2009b. *Monthly Status Report for January 2009, Hocomonco Pond Site, Westborough, Massachusetts. Letter from R. Anderson, Arcadis, to J. DiLorenzo, EPA and J. Naparstek, MassDEP.* Arcadis U.S., Inc. February 13, 2009.

Arcadis, 2009c. *Monthly Status Report for May 2009, Hocomonco Pond Site, Westborough, Massachusetts. Letter from R. Anderson, Arcadis, to J. DiLorenzo, EPA and J. Naparstek, MassDEP.* Arcadis U.S., Inc. June 12, 2009.

BBL, 2001. *Long Term Monitoring Plan.* Blasland, Bouck & Lee, Inc. Revised September, 2001.

BBL, 2001a. Letter from R. Anderson, BBL, to D. Golden, EPA and H. Panchal, MassDEP re:Long Term Monitoring Plan; Revised Long-Term Monitoring Plan and Response to Comments. Blasland, Bouck & Lee, Inc. October 2, 2001.

BBL, 2002. *Monthly Status Report for January 2002, Hocomonco Pond Site, Westborough, Massachusetts. Letter from R. Anderson, BBL, to D. Golden, EPA and H. Panchal, MassDEP.* Blasland, Bouck & Lee, Inc. February 14, 2002.

BBL, 2002a. *Long Term Monitoring Report, Hocomonco Pond Site, Westborough, Massachusetts.* Blasland, Bouck & Lee, Inc. June 2002.

BBL, 2003. *Monthly Status Report for December 2002, Hocomonco Pond Site, Westborough, Massachusetts, including the DNAPL Recovery Evaluation as an attachment. Letter from R. Anderson, BBL, to D. Golden, EPA and J. Naparstek, MassDEP.* Blasland, Bouck & Lee, Inc. January 9, 2003.

BBL, 2003a. *Operation and Monitoring Plan Modification for DNAPL Recovery, Hocomonco Pond Site, Westborough, Massachusetts. Letter from R. Anderson, BBL, to D. Golden, EPA and J. Naparstek, MassDEP.* Blasland, Bouck & Lee, Inc. April 14, 2003.

BBL, 2004. *Monthly Status Report for February 2004, Hocomonco Pond Site, Westborough, Massachusetts. Letter from R. Anderson, BBL, to D. Golden, EPA and J. Naparstek, MassDEP.* Blasland, Bouck & Lee, Inc. March 12, 2004.

BBL, 2004a. *Monthly Status Report for April 2004, Hocomonco Pond Site, Westborough, Massachusetts. Letter from R. Anderson, BBL, to D. Golden, EPA and J. Naparstek, MassDEP.* Blasland, Bouck & Lee, Inc. May 14, 2004.

BBL, 2004b. *Monthly Status Report for June 2004, Hocomonco Pond Site, Westborough, Massachusetts. Letter from R. Anderson, BBL, to D. Golden, EPA and J. Naparstek, MassDEP.* Blasland, Bouck & Lee, Inc. July 14, 2004.

BBL, 2004c. *Long Term Monitoring Report, Hocomonco Pond Site, Westborough, Massachusetts.* Blasland, Bouck & Lee, Inc. July 30, 2004.

BBL, 2004d. *Monthly Status Report for July 2004, Hocomonco Pond Site, Westborough, Massachusetts. Letter from R. Anderson, BBL, to D. Golden, EPA and J. Naparstek, MassDEP.* Blasland, Bouck & Lee, Inc. August 11, 2004.

BBL, 2005. *Final Long-Term Monitoring Report, Hocomonco Pond Site, Westborough, Massachusetts.* Blasland, Bouck & Lee, Inc. November 2005.

Beazer, 1998. *Modified Monitoring Program, Hocomonco Site. Letter from M. Bollinger, Beazer, to D. Golden, EPA.* Beazer East, Inc. June 18, 1998.

Beazer, 1999. *1998 and 1999 Analytical Data Summary and 1999 Operating Schedule, Hocomonco Site. Letter from M. Bollinger, Beazer, to D. Golden, EPA.* Beazer East, Inc. October 7, 1999.

Beazer, 2001. *Modified Treatment System Monitoring Program, Hocomonco Site. Letter from M. Bollinger, Beazer, to D. Golden, EPA.* Beazer East, Inc. November 21, 2001.

Beazer, 2002. *Updated Information on the Modified Treatment System Monitoring Program, Hocomonco Site. Letter from M. Bollinger, Beazer, to D. Golden, EPA.* Beazer East, Inc. March 11, 2002.

Bollinger, 2004. Personal communication between M. Bollinger, Beazer East, and D. Golden, EPA. Treated water effluent data, October 2002 – June 2004, provided via email. August 24, 2004.

Bollinger, 2004a. Personal communication between M. Bollinger, Beazer East, and D. Golden, EPA. Figure showing location of water treatment plant outfall, provided via email. August 24, 2004.

Bollinger, 2009. Personal communication between M. Bollinger, Beazer East, and J. DiLorenzo, EPA. Groundwater and DNAPL gauging data – 2006-2008. 2009.

Bollinger, 2009a. Personal communication between M. Bollinger, Beazer East, and J. DiLorenzo, EPA. Landfill and former lagoon area inspection forms for June 2009. July 21, 2009.

Bollinger, 2009b. Personal communication between M. Bollinger, Beazer East, and J. DiLorenzo, EPA. Sediment sampling results from July 2009. August 10, 2009.

Bollinger, 2009c. Personal communication between M. Bollinger, Beazer East, and J. DiLorenzo, EPA. O&M costs from 2004 to 2008. August 10, 2009.

Chester, 1993. *Chapter 6.0, Groundwater Monitoring, Final (100%) Design of Former Lagoon Remediation.* Long-Term Monitoring Plan, Appendix B (see BBL, 2001). January 1993.

Daylor, 2003. *Westborough Master Plan.* Daylor Consulting Group, Inc. Endorsed by Westborough Town Meeting, May 28, 2003.

EPA, 1985. *Record of Decision.* U.S. Environmental Protection Agency. September 30, 1985.

EPA, 1992a. *Explanation of Significant Differences.* U.S. Environmental Protection Agency. July 22, 1992.

EPA, 1992b. *Hocomonco Pond Superfund Site; Final Supplemental Decision Document.* U.S. Environmental Protection Agency. September 28, 1992.

EPA, 1999. *Explanation of Significant Differences.* U.S. Environmental Protection Agency. September 21, 1999.

EPA, 1999a. *Preliminary Close Out Report for the Hocomonco Pond Superfund Site, Westborough, Massachusetts.* U.S. Environmental Protection Agency. September 22, 1999.

EPA, 2000. *Interim Remedial Action Report for the Hocomonco Pond Superfund Site, Westborough, Massachusetts.* U.S. Environmental Protection Agency. September 28, 2000.

EPA, 2001. *Comprehensive Five-year Review Guidance, OSWER Directive 9355.7-03B-P*, U.S. Environmental Protection Agency. June 2001.

EPA, 2004a. *First Five-Year Review Report for Hocomonco Pond Superfund Site, Town of Westborough, Worcester County, Massachusetts,* U.S. Environmental Protection Agency, September 2004.

EPA, 2004b. *Reuse Assessment for the Hocomonco Pond Superfund Site, Westborough, Massachusetts,* U.S. Environmental Protection Agency, September 2004.

Executive Order 11988, Floodplains Management.

Executive Order 11990, Protection of Wetlands.

FIRM, 2002. *Flood Insurance Rate Map, Town of Westborough, Massachusetts.*

Fluor Daniel, 1997. *Certification Report for the Construction, Placement of Soils/Sediments and Capping of the On-Site landfill*, Fluor Daniel GTI. May 1997.

Fluor Daniel, 1997a. *Certification Report for the Former Lagoon Remediation*, Fluor Daniel GTI. May 1997.

Fluor Daniel, 1997b. *Certification Report for the Otis Street Storm Drain Sealing/Lining and Otis Street Culvert Cleaning*, Fluor Daniel GTI. May 1997.

Fluor Daniel GTI, 1998. *Report Demonstrating the Technical Impracticability of Restoring Groundwater at the Hocomonco Pond Site.* April 1998.

Golden, 2004. Personal communications between Derrick Golden, EPA and Phoebe Call, TtNUS. August 9, 10, 16, & 25; September 16, 2004.

Keystone, 1989. Supplemental *Public Health and Environmental Assessment for the Hocomonco Pond and Discharge Stream*, Keystone Environmental Resources, Inc. September 1989.

Keystone, 1992a. *Public Health and Environmental Assessment for the Hocomonco Pond and Discharge Stream*, Keystone Environmental Resources, Inc. February 1992.

Keystone, 1992b. *Public Health and Environmental Assessment for the Kettle Pond and Isolated Areas,* Keystone Environmental Resources, Inc. February 1992.

McNulty, 2004. Personal communications between Paul McNulty, Town of Westborough and TtNUS. June 9; September 16, 2004.

Orbital, 1997. *Water Treatment Plant and In Situ Bioremediation System Remedial Action Certification Report*, Orbital Engineering, Inc. June 1997.

US District Court, 1988. *Consent Decree*, January 10, 1988.

Westborough, 2001. Aquifer and Watershed Protection Districts, Town of Westborough, Massachusetts. Map produced February 2001 by Town of Westborough GIS.

APPENDIX B

SITE INSPECTION REPORT

Attendees at the Site Inspection for the Hocomonco Pond Five-Year Review - Held on July 7, 2009

Jim DiLorenzo, USEPA Region I, Remedial Project Manager
Mike Bollinger, Beazer East, Inc., PRP, Project Manager
Sean Czarniecki, Metcalf & Eddy/AECOM, Project Engineer/Risk Assessor
Cindy Castleberry, Metcalf & Eddy/AECOM, Task Order Manager
Greg Franks, Westborough Town Counsel
Maryanne Bilodeau, Westborough Assistant Town Manager
Randy Waterman, Waterman Design Associates/Westborough Community Land Trust
Jim Malloy, Westborough Town Manager
Nick Perron, Westborough Fire Chief
Bob Rand, Westborough Fire Prevention Officer/Local Emergency Planning Committee
Don Burn, Westborough Community Land Trust
Paul McNulty, Westborough Board of Health, Director
Earl Storey, Westborough DPW Parks and Recreation
Frank DeSiata, Westborough Recreation Department
Rich Voutas, Westborough DPW Assistant Manager

Five-Year Review Site Inspection Checklist

("N/A" refers to "not applicable.")

<table>
<tr><th colspan="2">I. SITE INFORMATION</th></tr>
<tr><td>Site name: Hocomonco Pond Superfund Site</td><td>Date of inspection: July 7, 2009</td></tr>
<tr><td>Location and Region: Westborough, MA; Region I</td><td>EPA ID: MAD001002252</td></tr>
<tr><td>Agency, office, or company leading the five-year review: USEPA/AECOM (formerly Metcalf & Eddy, Inc.)</td><td>Weather/temperature: Overcast/65-70°F</td></tr>
<tr><td colspan="2">Remedy Includes: (Check all that apply)
X Landfill cover/containment
X Access controls
X Institutional controls
☐ Groundwater pump and treatment
☐ Surface water collection and treatment
X Other_Passive DNAPL Recovery____
☐ Monitored natural attenuation
X Groundwater containment
☐ Vertical barrier walls</td></tr>
<tr><td colspan="2">Attachments: ☐ Inspection team roster attached ☐ Site map attached</td></tr>
<tr><th colspan="2">II. INTERVIEWS</th></tr>
<tr><td colspan="2">Interviews were performed by USEPA/AECOM (formerly Metcalf & Eddy, Inc.) and are included separately.</td></tr>
</table>

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)				
1.	**O&M Documents**			
	☐ O&M manual	☐ Readily available	☐ Up to date	☐ N/A
	☐ As-built drawings	☐ Readily available	☐ Up to date	☐ N/A
	☐ Maintenance logs	☐ Readily available	☐ Up to date	☐ N/A
	Remarks: Not reviewed			
2.	**Site-Specific Health and Safety Plan**	☐ Readily available	☐ Up to date	☐ N/A
	☐ Contingency plan/emergency response plan	☐ Readily available	☐ Up to date	☐ N/A
	Remarks: Not reviewed			
3.	**O&M and OSHA Training Records**	☐ Readily available	☐ Up to date	☐ N/A
	Remarks: Not reviewed			
4.	**Permits and Service Agreements**			
	☐ Air discharge permit	☐ Readily available	☐ Up to date	X N/A
	X Effluent discharge	☐ Readily available	☐ Up to date	☐ N/A
	☐ Waste disposal, POTW	☐ Readily available	☐ Up to date	X N/A
	☐ Other permits________________	☐ Readily available	☐ Up to date	X N/A
	Remarks: Not reviewed			
5.	**Gas Generation Records**	☐ Readily available	☐ Up to date	X N/A
	Remarks:			
6.	**Settlement Monument Records**	☐ Readily available	☐ Up to date	X N/A
	Remarks:			
7.	**Groundwater Monitoring Records**	☐ Readily available	X Up to date	☐ N/A
	Remarks:			
8.	**Leachate Extraction Records**	☐ Readily available	☐ Up to date	☐ N/A
	Remarks: Leachate no longer collected			
9.	**Discharge Compliance Records**			
	☐ Air	☐ Readily available	☐ Up to date	X N/A
	X Water (effluent)	☐ Readily available	☐ Up to date	☐ N/A
	Remarks: Effluent water is currently not discharged, so there were no recent records for review.			
10.	**Daily Access/Security Logs**	☐ Readily available	☐ Up to date	☐ N/A
	Remarks: Not reviewed			

IV. O&M COSTS	
1.	**O&M Organization** ☐ State in-house ☐ Contractor for State ☐ PRP in-house X Contractor for PRP ☐ Federal Facility in-house ☐ Contractor for Federal Facility ☐ Other
2.	**O&M Cost Records** Not reviewed at the time of the site inspection.
3.	**Unanticipated or Unusually High O&M Costs During Review Period** Describe costs and reasons: No issues noted during review of monthly reports that would result in unusually high O&M costs with respect to DNAPL collection.

V. ACCESS AND INSTITUTIONAL CONTROLS X Applicable ☐ N/A	
A. Fencing	
1.	**Fencing damaged** ☐ Location shown on site map X Gates secured ☐ N/A Remarks: Fencing appeared to be in good shape and is checked annually.
B. Other Access Restrictions	
1.	**Signs and other security measures** ☐ Location shown on site map ☐ N/A Remarks: Signs posted on fence at random intervals stating "No Trespassing".

C. Institutional Controls (ICs)

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented ☐ Yes ☐ No X N/A
Site conditions imply ICs not being fully enforced ☐ Yes ☐ No X N/A

Type of monitoring (*e.g.*, self-reporting, drive by) ____________
Frequency ____________
Responsible party/agency ____________
Contact ____________ Name ____________ Title ____________ Date ____________ Phone no.

Reporting is up-to-date ☐ Yes ☐ No X N/A
Reports are verified by the lead agency ☐ Yes ☐ No X N/A

Specific requirements in deed or decision documents have been met ☐ Yes ☐ No X N/A
Violations have been reported ☐ Yes ☐ No X N/A
Other problems or suggestions: ☐ Report attached

Remarks: ICs have not yet been implemented

2. **Adequacy** ☐ ICs are adequate ☐ ICs are inadequate X N/A
Remarks____________

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map X No vandalism evident

Remarks: None noted in the past five years

2. **Land use changes on site** X N/A
Remarks____________

3. **Land use changes off site** X N/A
Remarks____________

VI. GENERAL SITE CONDITIONS

A. Roads X Applicable ☐ N/A

1. **Roads damaged** ☐ Location shown on site map X Roads adequate ☐ N/A
Remarks____________

B. Other Site Conditions

Remarks ____

VII. LANDFILL COVERS X Applicable ☐ N/A

****Note that this information covers both the landfill and former lagoon area caps****

A. Landfill Surface

1. **Settlement** (Low spots) ☐ Location shown on site map X Settlement not evident
   Areal extent______________ Depth____________
   Remarks____

2. **Cracks** ☐ Location shown on site map X Cracking not evident
   Lengths____________ Widths___________ Depths__________
   Remarks____

3. **Erosion** ☐ Location shown on site map X Erosion not evident
   Areal extent______________ Depth____________
   Remarks____

4. **Holes** ☐ Location shown on site map X Holes not evident
   Areal extent______________ Depth____________

   Remarks:

5. **Vegetative Cover** X Grass X Cover properly established X No signs of stress
   X Trees/Shrubs (indicate size and locations on a diagram)

   Remarks:

   Landfill – The vegetative cover on the southwest corner of the landfill was not as "impressive" as the rest of the cover, but did not appear to be an issue.

   Former Lagoon – Vegetative growth on the stone-faced side slopes appeared to be slightly large. Trimming should be performed around the entire outside of the cover.

6. **Alternative Cover (armored rock, concrete, etc.)** ☐ N/A

   Remarks: Rocks were used for side slopes of the Former Lagoon cover. Vegetative growth through the rocks should be reduced.

7.	**Bulges** Areal extent______ Remarks______	☐ Location shown on site map Height______	X Bulges not evident
8.	**Wet Areas/Water Damage** ☐ Wet areas ☐ Ponding ☐ Seeps ☐ Soft subgrade Remarks______	X Wet areas/water damage not evident ☐ Location shown on site map ☐ Location shown on site map ☐ Location shown on site map ☐ Location shown on site map	 Areal extent______ Areal extent______ Areal extent______ Areal extent______
9.	**Slope Instability** ☐ Slides Areal extent______ Remarks______	☐ Location shown on site map	X No evidence of slope instability
B. Benches	☐ Applicable X N/A (Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)		
1.	**Flows Bypass Bench** Remarks______	☐ Location shown on site map	X N/A or okay
2.	**Bench Breached** Remarks______	☐ Location shown on site map	X N/A or okay
3.	**Bench Overtopped** Remarks______	☐ Location shown on site map	X N/A or okay
C. Letdown Channels	☐ Applicable X N/A (Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)		
1.	**Settlement** Areal extent______ Remarks______	☐ Location shown on site map Depth______	☐ No evidence of settlement
2.	**Material Degradation** Material type______ Remarks______	☐ Location shown on site map Areal extent______	☐ No evidence of degradation
3.	**Erosion** Areal extent______ Remarks______	☐ Location shown on site map Depth______	☐ No evidence of erosion

4.	**Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting Areal extent______________ Depth____________ Remarks____
5.	**Obstructions** Type____________________ ☐ No obstructions ☐ Location shown on site map Areal extent______________ Size____________ Remarks____
6.	**Excessive Vegetative Growth** Type____________________ ☐ No evidence of excessive growth ☐ Vegetation in channels does not obstruct flow ☐ Location shown on site map Areal extent______________ Remarks____
D. Cover Penetrations X Applicable ☐ N/A	
1.	**Gas Vents** ☐ Active X Passive ☐ Properly secured/locked X Functioning ☐ Routinely sampled X Good condition ☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A Remarks: Applies to landfill only.
2.	**Gas Monitoring Probes** ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition ☐ Evidence of leakage at penetration ☐ Needs Maintenance X N/A Remarks:
3.	**Monitoring Wells** (within surface area of landfill) ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition ☐ Evidence of leakage at penetration ☐ Needs Maintenance X N/A Remarks____
4.	**Leachate Extraction Wells** ☐ Properly secured/locked X Functioning ☐ Routinely sampled ☐ Good condition ☐ Evidence of leakage at penetration ☐ Needs Maintenance X N/A Remarks____
5.	**Settlement Monuments** ☐ Located ☐ Routinely surveyed X N/A Remarks:

E. Gas Collection and Treatment	☐ Applicable X N/A
1.	**Gas Treatment Facilities** ☐ Flaring ☐ Thermal destruction ☐ Collection for reuse ☐ Good condition ☐ Needs Maintenance Remarks:
2.	**Gas Collection Wells, Manifolds and Piping** ☐ Good condition ☐ Needs Maintenance Remarks:
3.	**Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings) ☐ Good condition ☐ Needs Maintenance ☐ N/A Remarks____
F. Cover Drainage Layer	☐ Applicable ☐ N/A
Remarks: Actual cap construction unknown. Drainage layer assumed, but connection to outlet rock not clear. Drainage appears adequate for both caps.	
1.	**Outlet Pipes Inspected** ☐ Functioning X N/A Remarks:
2.	**Outlet Rock Inspected** ☐ Functioning ☐ N/A Remarks:
G. Detention/Sedimentation Ponds	☐ Applicable X N/A
1.	**Siltation** Areal extent____________ Depth__________ ☐ N/A ☐ Siltation not evident Remarks____
2.	**Erosion** Areal extent____________ Depth__________ ☐ Erosion not evident Remarks____
3.	**Outlet Works** ☐ Functioning ☐ N/A Remarks____
4.	**Dam** ☐ Functioning ☐ N/A Remarks____

H. Retaining Walls ☐ Applicable X N/A	
1.	**Deformations** ☐ Location shown on site map ☐ Deformation not evident Horizontal displacement__________ Vertical displacement__________ Rotational displacement__________ Remarks__________
2.	**Degradation** ☐ Location shown on site map ☐ Degradation not evident Remarks__________
I. Perimeter Ditches/Off-Site Discharge X Applicable ☐ N/A Remarks: Perimeter ditches are natural berms	
1.	**Siltation** ☐ Location shown on site map ☐ Siltation not evident Areal extent__________ Depth__________ Remarks__________
2.	**Vegetative Growth** ☐ Location shown on site map ☐ N/A X Vegetation does not impede flow Areal extent__________ Type__________ Remarks:
3.	**Erosion** ☐ Location shown on site map X Erosion not evident Areal extent__________ Depth__________ Remarks__________
4.	**Discharge Structure** ☐ Functioning X N/A Remarks__________
VIII. VERTICAL BARRIER WALLS ☐ Applicable X N/A	
1.	**Settlement** ☐ Location shown on site map ☐ Settlement not evident Areal extent__________ Depth__________ Remarks__________
2.	**Performance Monitoring** Type of monitoring__________ ☐ Performance not monitored Frequency__________ ☐ Evidence of breaching Head differential__________ Remarks__________

IX. GROUNDWATER/SURFACE WATER REMEDIES X Applicable ☐ N/A
A. Groundwater Extraction Wells, Pumps, and Pipelines X Applicable ☐ N/A
1. **Pumps, Wellhead Plumbing, and Electrical** X Good condition X All required wells properly operating ☐ Needs Maintenance ☐ N/A Remarks
2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances** X Good condition ☐ Needs Maintenance Remarks
3. **Spare Parts and Equipment** ☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided Remarks: Not determined
B. Surface Water Collection Structures, Pumps, and Pipelines ☐ Applicable X N/A
1. **Collection Structures, Pumps, and Electrical** ☐ Good condition ☐ Needs Maintenance Remarks
2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances** ☐ Good condition ☐ Needs Maintenance Remarks
3. **Spare Parts and Equipment** ☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided Remarks

C. Treatment System ☐ Applicable X N/A Remarks: Treatment system remains in place, but not operating	
1.	**Treatment Train** (Check components that apply) X Metals removal X Oil/water separation ☐ Bioremediation ☐ Air stripping X Carbon adsorbers X Sand Filters X Additive (*e.g.*, chelation agent, flocculent) pH adjustment chemicals, flocculent ☐ Others________ X Good condition ☐ Needs Maintenance ☐ Sampling ports properly marked and functional ☐ Sampling/maintenance log displayed and up to date ☐ Equipment properly identified ☐ Quantity of groundwater treated annually________ ☐ Quantity of surface water treated annually________ Remarks: Review of the system was superficial, since it is no longer used as part of a groundwater extraction remedy
2.	**Electrical Enclosures and Panels** (properly rated and functional) ☐ N/A X Good condition ☐ Needs Maintenance Remarks________
3.	**Tanks, Vaults, Storage Vessels** ☐ N/A X Good condition X Proper secondary containment ☐ Needs Maintenance Remarks________
4.	**Discharge Structure and Appurtenances** ☐ N/A ☐ Good condition ☐ Needs Maintenance Remarks: Not inspected
5.	**Treatment Building(s)** ☐ N/A X Good condition (esp. roof and doorways) ☐ Needs repair X Chemicals and equipment properly stored Remarks________
6.	**Monitoring Wells** (pump and treatment remedy) X Properly secured/locked X Functioning X Routinely sampled X Good condition X All required wells located ☐ Needs Maintenance ☐ N/A Remarks________
D. Monitoring Data Remarks: Review of site monitoring data is provided in the Data Review section of the text of the five-year review report.	
1.	Monitoring Data ☐ Is routinely submitted on time ☐ Is of acceptable quality
2.	Monitoring data suggests: ☐ Groundwater plume is effectively contained ☐ Contaminant concentrations are declining

C. Treatment System ☐ Applicable X N/A Remarks: Treatment system remains in place, but not operating	
1.	**Treatment Train** (Check components that apply) X Metals removal X Oil/water separation ☐ Bioremediation ☐ Air stripping X Carbon adsorbers X Sand Filters X Additive (*e.g.*, chelation agent, flocculent) pH adjustment chemicals, flocculent ☐ Others__________ X Good condition ☐ Needs Maintenance ☐ Sampling ports properly marked and functional ☐ Sampling/maintenance log displayed and up to date ☐ Equipment properly identified ☐ Quantity of groundwater treated annually__________ ☐ Quantity of surface water treated annually__________ Remarks: Review of the system was superficial, since it is no longer used as part of a groundwater extraction remedy
2.	**Electrical Enclosures and Panels** (properly rated and functional) ☐ N/A X Good condition ☐ Needs Maintenance Remarks__________
3.	**Tanks, Vaults, Storage Vessels** ☐ N/A X Good condition X Proper secondary containment ☐ Needs Maintenance Remarks__________
4.	**Discharge Structure and Appurtenances** ☐ N/A ☐ Good condition ☐ Needs Maintenance Remarks: Not inspected
5.	**Treatment Building(s)** ☐ N/A X Good condition (esp. roof and doorways) ☐ Needs repair X Chemicals and equipment properly stored Remarks__________
6.	**Monitoring Wells** (pump and treatment remedy) X Properly secured/locked X Functioning X Routinely sampled X Good condition X All required wells located ☐ Needs Maintenance ☐ N/A Remarks__________
D. Monitoring Data Remarks: Review of site monitoring data is provided in the Data Review section of the text of the five-year review report.	
1.	Monitoring Data ☐ Is routinely submitted on time ☐ Is of acceptable quality
2.	Monitoring data suggests: ☐ Groundwater plume is effectively contained ☐ Contaminant concentrations are declining

D. Monitored Natural Attenuation
1. **Monitoring Wells** (natural attenuation remedy) ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition ☐ All required wells located ☐ Needs Maintenance X N/A Remarks______

X. OTHER REMEDIES
If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS
A. Implementation of the Remedy
Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.). This source control/containment remedy appears to be operating as designed.
B. Adequacy of O&M
Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy. The landfill and former lagoon covers appear to be well-maintained. The DNAPL extraction wells also appear to be well-maintained along with the groundwater treatment equipment which is no longer used as part of the remedy.

C. Early Indicators of Potential Remedy Problems
Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future. None
D. Opportunities for Optimization
Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. DNAPL is currently transferred to new containers/tanks multiple times prior to leaving the site. It may be best to pump directly into 55-gallon drums and ship them off-site without any transfer between containers to minimize handling and risk of spills.

Hocomonco Pond – 5-Year Review Site Inspection Photo Log

07/07/09

Photo(s)	Description
1323-1326, 1329, 1375	Interior views of water treatment building
1327-1328	Drum of creosote inside water treatment building
1330-1331	Tanks behind water treatment building
1332-1333	View of landfill area facing south
1334	View of DNAPL recovery wells facing north
1335-1337	Panorama showing DNAPL recovery wells to storage tanks
1338-1339	DNAPL recovery wells
1340	Bioremediation recovery wells
1341	Kettle pond – view facing south
1342-1344	Panorama showing kettle pond area
1345-1347	Panorama showing southwest corner of landfill
1348	Southwest corner of landfill
1349	Southwest corner of landfill facing northeast
1350-1352	Panorama – view of landfill from northwest corner facing southeast
1353-1356	Panorama – view of former lagoon area cap facing south
1357-1358	Panorama – view of vegetation on western sideslope of former lagoon area
1359	View of top of former lagoon area facing north
1360-1361	Panorama – view of vegetation on western sideslope of former lagoon area
1362	View of gate exiting to Smith Valve Pkwy.
1363-1365	Historic concrete structures between former lagoon area and Hocomonco Pond
1366	View from ridge near concrete structures facing northeast
1367-1370	Views along outfall discharge area
1371-1374	Panorama - Hocomonco Pond from boat launch area, northeast of former lagoon area
1376-1379	Panorama – Hocomonco Pond from unofficial boat launch area near water treatment plant gate
1380	Hocomonco Pond from unofficial boat launch area near water treatment plant gate – heron in center of picture near far shore
1381	Well near water treatment plant gate
1382-1383	Panorama – Unofficial boat launch area near water treatment plant gate
1384	Hocomonco stream outlet across Otis Street
1385	Location of Hocomonco stream outlet from Otis Street facing east

Panorama showing DNAPL recovery wells to storage tanks

Panorama showing kettle pond area

Panorama showing southwest corner of landfill

Panorama – view of landfill from northwest corner facing southeast

Panorama – view of former lagoon area cap facing south

Panorama – view of vegetation on western sideslope of former lagoon area

Panorama – view of vegetation on western sideslope of former lagoon area

Panorama – Hocomonco Pond from boat launch area, northeast of former lagoon

Panorama – Hocomonco Pond from unofficial boat launch area near water treatment plant gate

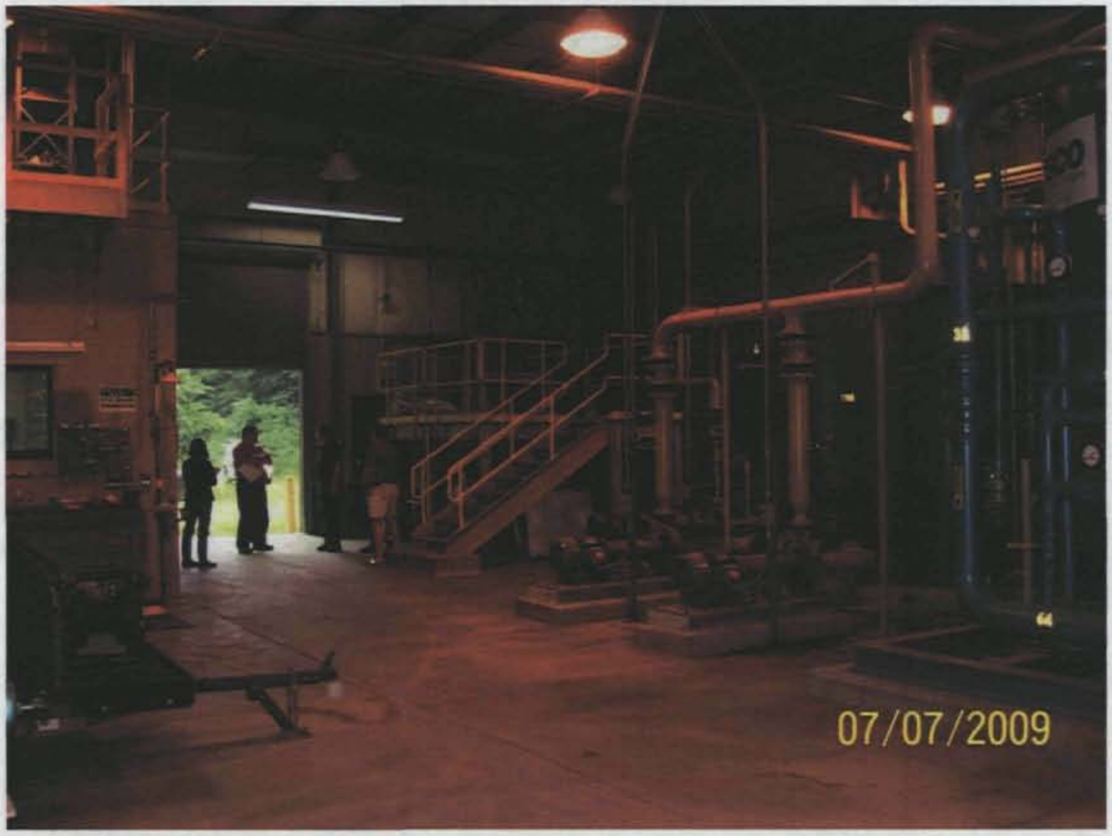
Panorama – Unofficial boat launch area near water treatment plant gate

Interior view of water treatment building

Interior view of water treatment building

Interior view of water treatment building

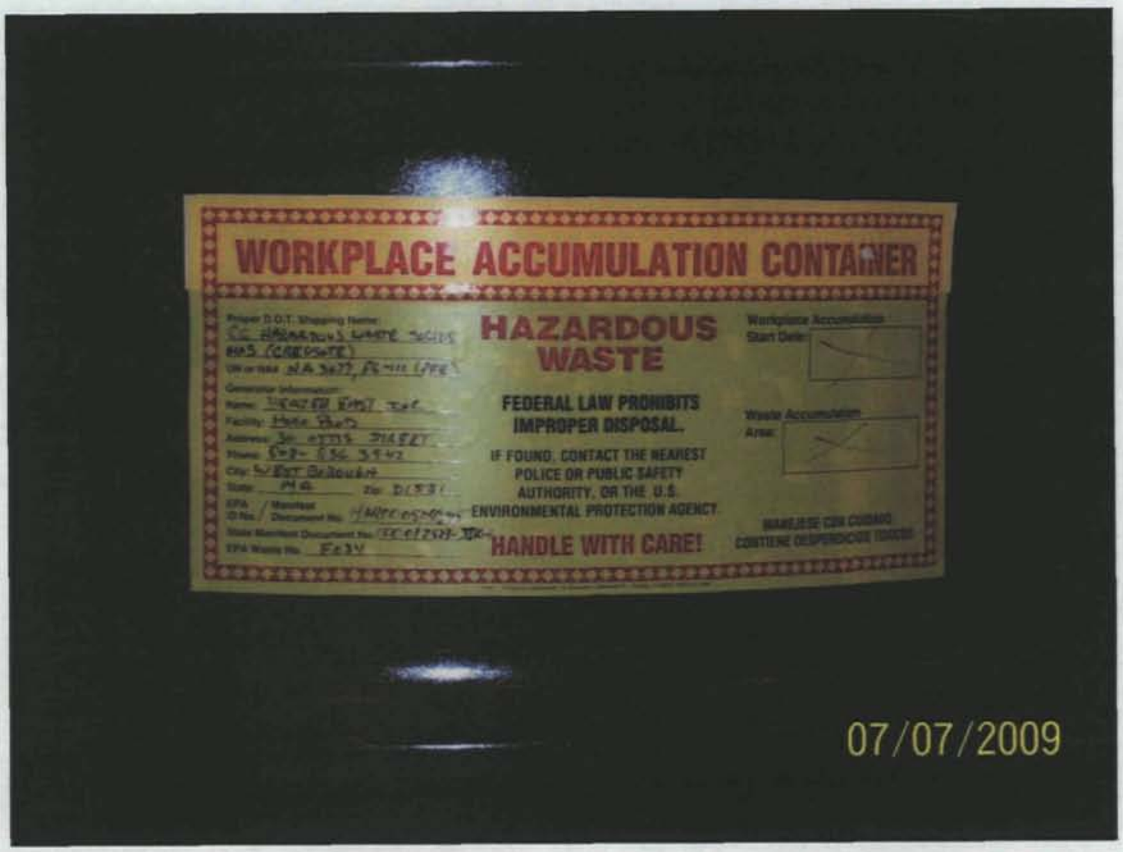
Interior view of water treatment building



Interior view of water treatment building

Interior view of water treatment building

Drum of creosote inside water treatment building



Drum of creosote inside water treatment building

Tanks behind water treatment building

Tanks behind water treatment building

View of landfill area facing south

View of landfill area facing south

View of DNAPL recovery wells facing north

DNAPL recovery wells

DNAPL recovery wells

Bioremediation recovery wells

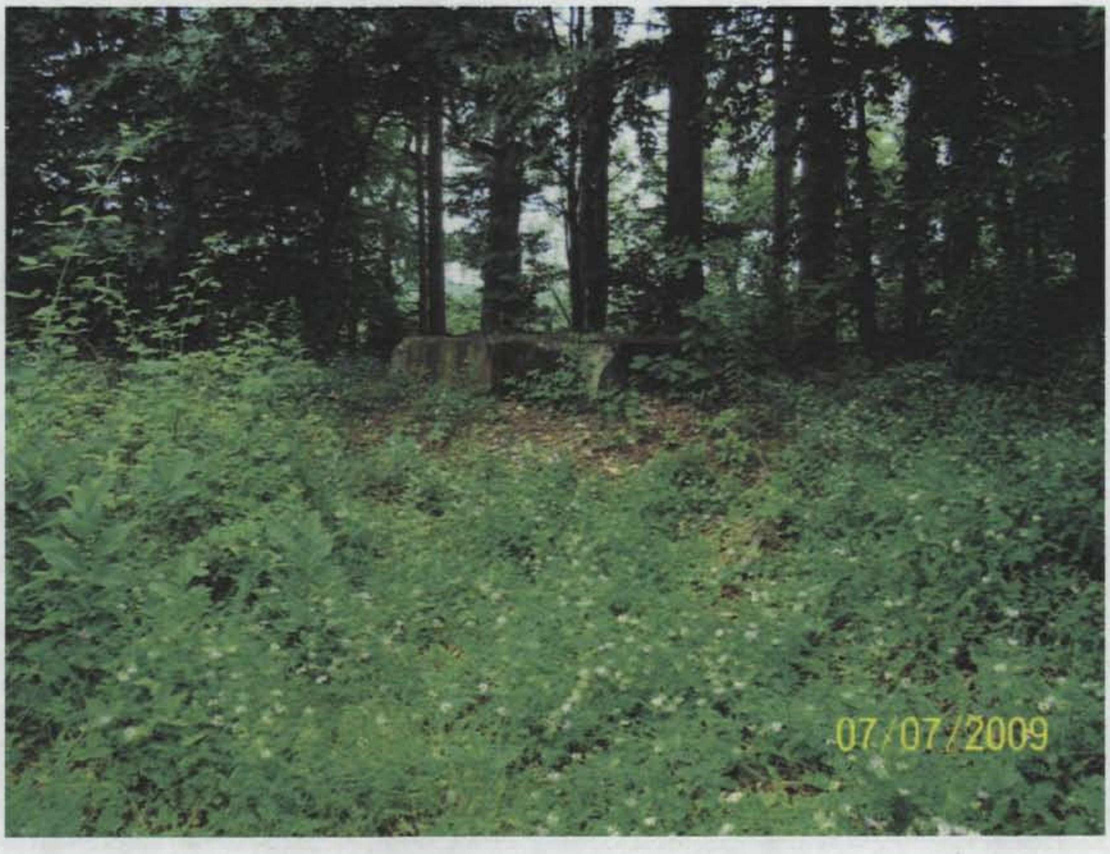
Kettle pond – view facing south

Southwest corner of landfill

Southwest corner of landfill facing northeast

View of top of former lagoon area facing north

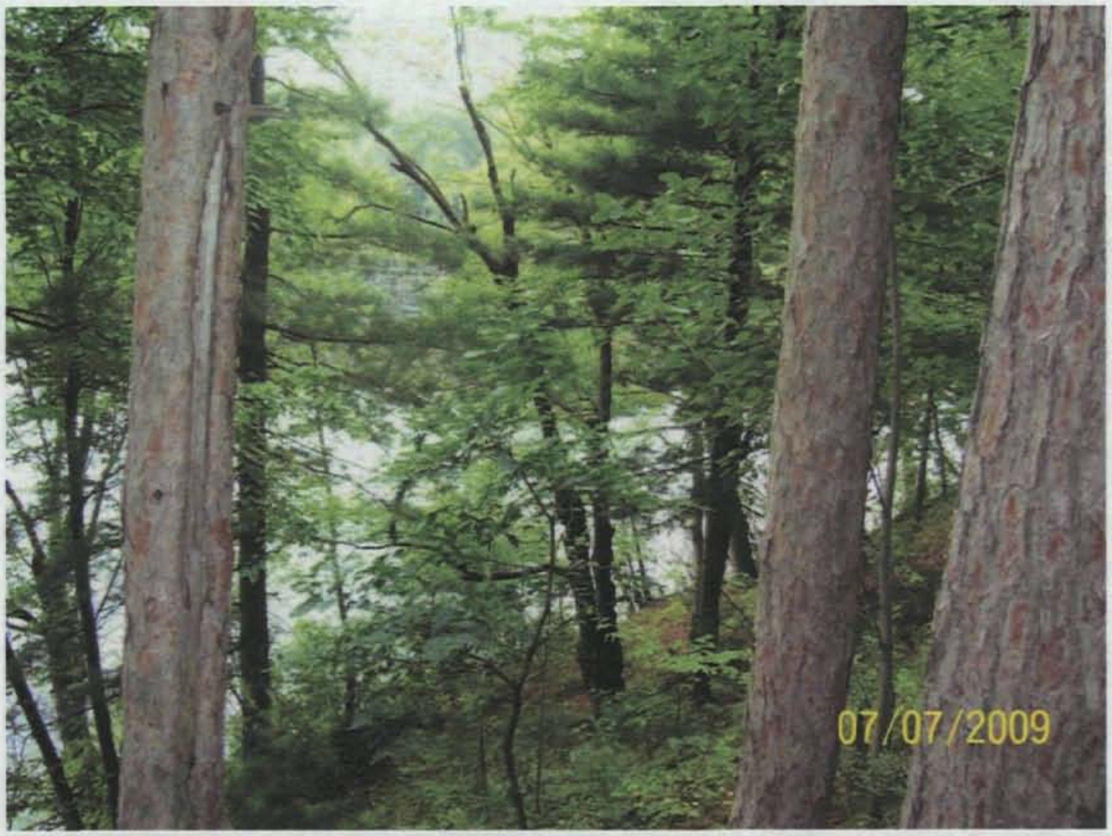
View of gate exiting to Smith Valve Pkwy.



Historic concrete structures between former lagoon area and Hocomonco Pond

Historic concrete structures between former lagoon area and Hocomonco Pond

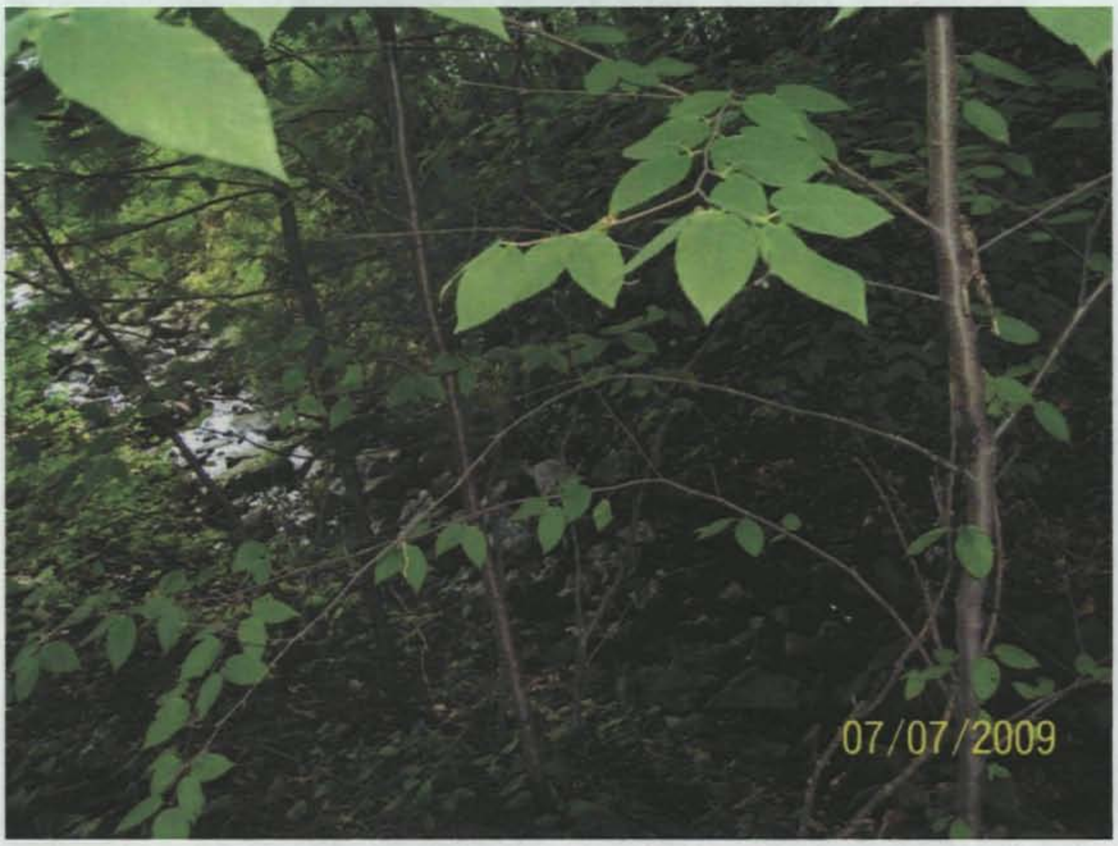
Historic concrete structures between former lagoon area and Hocomonco Pond



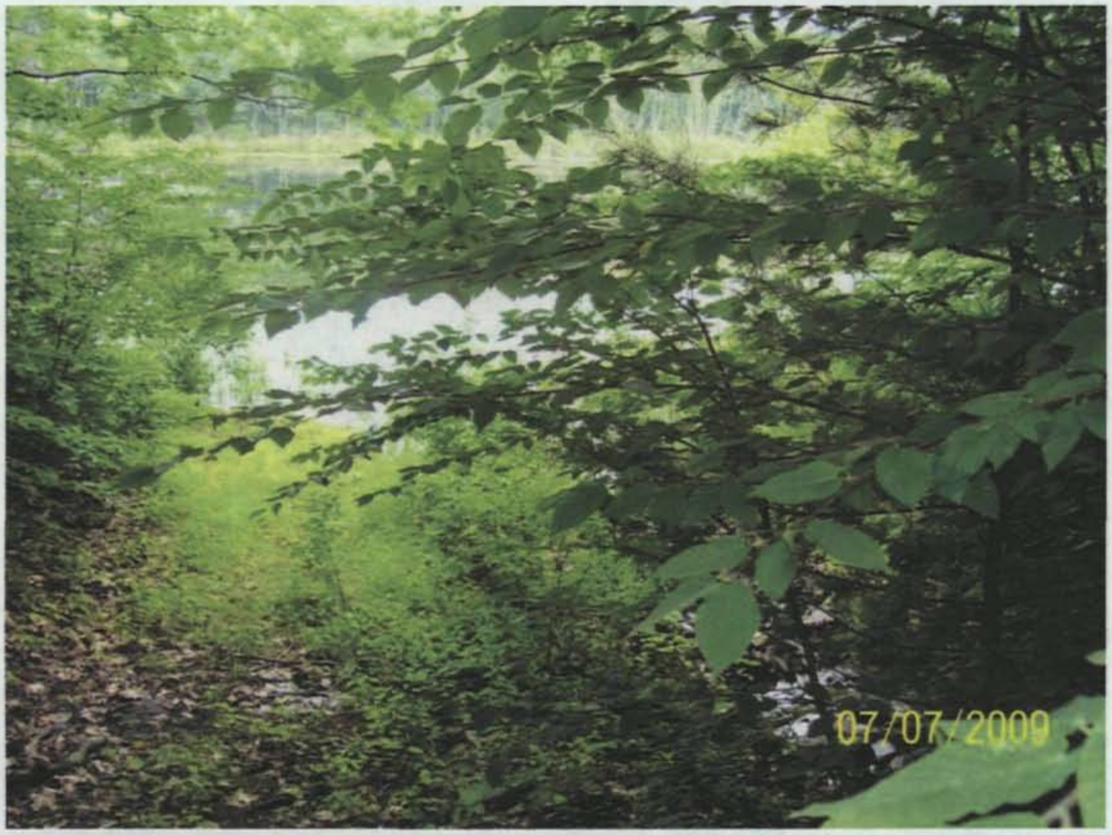
View from ridge near concrete structures facing northeast

View along outfall discharge area

View along outfall discharge area



View along outfall discharge area



View along outfall discharge area

Hocomonco Pond from unofficial boat launch area near water treatment plant gate

Well near water treatment plant gate

Location of Hocomonco stream outlet from Otis Street facing east

Hocomonco stream outlet across Otis Street

APPENDIX C

INTERVIEWS

Individuals Interviewed for the Hocomonco Pond Five-Year Review

Name/Position	Organization/Location	Date
Mike Bollinger/PRP Project Manager	Beazer East, Inc./ Pittsburgh, PA	July 7, 2009
Paul McNulty/Director of Public Health	Town of Westborough, MA Board of Health	July 7, 2009
Don Burn/Community Stakeholder	Town Resident and Stewardship Chairman, Westborough Community Land Trust	July 7, 2009
Rich Voutas/Assistant DPW Director	Town of Westborough, MA	July 7, 2009
Frank Desiata/Recreation Director	Town of Westborough, MA	July 7, 2009
Derrick Golden/Former Hocomonco Remedial Project Manager	USEPA Region I, Boston, MA	July 15, 2009
Jay Naparstek/State Remedial Project Manager	MA Department of Environmental Protection, Boston, MA	July 27, 2009
Steve Mangion/Hydrologist	USEPA Region I, Boston, MA	July 27, 2009
Bart Hoskins/Ecological Risk Assessor	USEPA Region I, Boston, MA	July 23, 2009

INTERVIEW RECORD

Site Name: Hocomonco Pond Superfund Site (Westborough, MA)	**EPA ID No.:** MAD980732341	
Subject: Five Year Review	**Time:** ~1130	**Date:** 7/7/09
Type: ☐ Telephone ■ Visit ☐ Other **Location of Visit:** Hocomonco Pond site	☐ Incoming ☐ Outgoing	

Contact Made By:

Name:	**Title:**	**Organization:**
Cindy Castleberry	Task Order Manager	Metcalf &Eddy, Inc

Individual Contacted:

Name:	**Title:**	**Organization:**
Michael Bollinger	PRP Project Manager	Beazer East, Inc.
Telephone No: 412-208-8664 **Fax No:** **E-Mail Address:**	**Street Address:** Pittsburgh, PA	

1.A. What is your overall impression of the project? (general sentiment)

Mr. Bollinger stated that his impression is generally positive. He has been able to work cooperatively with EPA. He has dealt with challenging conditions. He is content with where things are at now and looking forward to reducing operations to the extent possible.

2.A. Is the remedy functioning as expected? How well is the remedy performing?

Mr. Bollinger feels that the remedy continues to function as expected.

3.A. What does the monitoring data show? Are there any trends that show contaminant levels are decreasing?

Mr. Bollinger indicated that monitoring data shows a stable groundwater plume and stable DNAPL area.

4.A. Is there a continuous on-site O&M presence? If so, please describe staff and

activities. If there is not a continuous on-site presence, describe staff and frequency of site inspections and activities.

Mr. Bollinger stated that there is no a continuous on-site O&M presence, but the O&M contractor is on-site on a weekly basis, usually 1 to 2 days per week.

5.A. Have there been any significant changes in the O&M requirements, maintenance schedules, or sampling routines since start-up or in the last five years? If so, do they affect the protectiveness or effectiveness of the remedy? Please describe changes and impacts.

Mr. Bollinger stated that O&M has been relatively static in the last five years.

6.A. Have there been unexpected O&M difficulties or costs at the site since start-up or in the last five years? If so, please give details.

Mr. Bollinger stated that there have not been any unexpected O&M difficulties in the past five years.

7.A. Have there been opportunities to optimize O&M, or sampling efforts? Please describe changes and resultant or desired cost savings or improved efficiency.

Mr. Bollinger state that he is currently exploring opportunities to optimize O&M with EPA regarding collection and management of DNAPL. His expectation is that changes will maintain efficiency but reduce O&M costs.

8.A. Do you have any comments, suggestions, or recommendations regarding the project?

Mr. Bollinger states that he has none at this time.

INTERVIEW RECORD

Site Name: Hocomonco Pond Superfund Site (Westborough, MA)	**EPA ID No.:** MAD980732341	
Subject: Five Year Review	**Time:** ~1100	**Date:** 7/7/09
Type: ☐ Telephone ■ Visit ☐ Other **Location of Visit:** Hocomonco Pond site	☐ Incoming ☐ Outgoing	

Contact Made By:

Name: Cindy Castleberry	**Title:** Task Order Manager	**Organization:** Metcalf &Eddy, Inc

Individual Contacted:

Name: Paul McNulty	**Title:** Public Health Director	**Organization:** Town of Westborough
Telephone No: 508-366-3045 **Fax No:** 508-366-3047 **E-Mail Address:** pmcnulty@town.westborough.ma.us	**Street Address:** 45 West Main Street Westborough, MA 01581	

1.A. What is your overall impression of the project? (general sentiment)

Mr. McNulty stated that his overall impression is good, but that it is a long process.

2.A. Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please give purpose and results.

Mr. McNulty states his involvement has been once every 5 years, related to the five-year reviews.

3.A. Have there been any complaints, violations, or other incidents related to the site requiring response by your office? If so, give details of the events and results of the responses.

Mr. McNulty stated that there have not been any complaints, violations, or incidents.

4.A. Do you feel well informed about the site's activities and progress?

Mr. McNulty stated that he feels well informed.

5.A. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?

Mr. McNulty stated that he has no complaints. He would like to see fencing put around the landfill cap and former lagoon cap and at least a portion of the site turned over to the Town for passive recreation.

INTERVIEW RECORD

Site Name: Hocomonco Pond Superfund Site (Westborough, MA)	**EPA ID No.:** MAD980732341	
Subject: Five Year Review	**Time:** 1050	**Date:** 7/7/09
Type: ☐ Telephone ■ Visit ☐ Other **Location of Visit:** Hocomonco Pond site	☐ Incoming ☐ Outgoing	

Contact Made By:

Name:	**Title:**	**Organization:**
Sean Czarniecki	Project Engineer	Metcalf &Eddy, Inc

Individual Contacted:

Name:	**Title:**	**Organization:**
Don Burn	Community Stakeholder	Town resident and Stewardship Chairman, Westborough Community Land Trust
Telephone No: 508-366-6438 **Fax No:** **E-Mail Address:** burn@windrvr.com	**Street Address:**	

1.A. What is your overall impression of the project? (general sentiment)

Mr. Burn stated that the project is being done well. He would like to see it get to a phase where it isn't just known as a Superfund site, but rather known for passive, and potentially active, uses.

2.A. What effects have site operations had on the surrounding community?

Mr. Burn stated that he is not aware of any effects on the surrounding community. He noted that the Housing Authority had their eye on the property for a little while.

3.A. Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details.

Mr. Burn is not aware of any community concerns regarding the site or its operation and administration. No matter what, "old-timers" will always feel that it will not be clean enough for any use. He also noted that the fishermen in the area appear to be catching and releasing, rather than consuming fish from the pond.

4.A Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details.

Mr. Burn is not aware of any vandalism. He noted that there is sometimes dumping on the non-fenced portions of the property. They once had to remove 70 tires.

5.A. Do you feel well informed about the site's activities and progress?

Mr. Burn stated that, in his position, he is well-informed about the site's activities and progress.

6.A Do you have any comments, suggestions, or recommendations regarding the site's management or operation?

Mr. Burn stated that he does not have any comments, suggestions or recommendations regarding the site's management or operation. His concern is regarding who will pay for what as the site gets shut down (e.g., fence removal, fence installation, loaming/seeding, etc.).

INTERVIEW RECORD

Site Name: Hocomonco Pond Superfund Site (Westborough, MA)	**EPA ID No.:** MAD980732341	
Subject: Five Year Review	**Time:** ~1100	**Date:** 7/7/09
Type: ☐ Telephone ■ Visit ☐ Other **Location of Visit:** Hocomonco Pond site	☐ Incoming ☐ Outgoing	

Contact Made By:

Name:	**Title:**	**Organization:**
Cindy Castleberry	Task Order Manager	Metcalf &Eddy, Inc

Individual Contacted:

Name:	**Title:**	**Organization:**
Rich Voutas, Assistant DPW Director Frank Desiata, Recreation Director		Town of Westborough
Telephone No: **Fax No:** **E-Mail Address:**	**Street Address:**	

1.A. What is your overall impression of the project? (general sentiment)

Mr. Voutas and Mr. Desiata stated that the site is well maintained.

2.A. What effects have site operations had on the surrounding community?

Mr. Voutas and Mr. Desiata stated that there has not been a large effect. Site operations are quiet.

3.A. Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details.

Mr. Voutas and Mr. Desiata stated that there may have been many years ago, but not now.

4.A Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details.

Mr. Voutas and Mr. Desiata stated they are not aware of any such incidents.

5.A. Do you feel well informed about the site's activities and progress?

Mr. Voutas and Mr. Desiata stated that they do feel well informed, particularly after today's site visit.

6.A Do you have any comments, suggestions, or recommendations regarding the site's management or operation?

Mr. Voutas and Mr. Desiata stated they would like to continue to see the Town kept in the loop with regard to decision making on the future of the site.

INTERVIEW RECORD

Site Name: Hocomonco Pond Superfund Site (Westborough, MA)	**EPA ID No.:** MAD980732341	
Subject: Five Year Review	**Time:** 8:30 am	**Date: 07/15/2009**
Type: ☐ Telephone ☐ Visit ■Other **Location of Visit:** Hocomonco Pond site	☐ Incoming ☐ Outgoing	

Contact Made By:

Name:	**Title:**	**Organization:**
Cindy Castleberry	Task Order Manager	Metcalf &Eddy, Inc
Sean Czarniecki	Project Engineer	Metcalf &Eddy, Inc

Individual Contacted:

Name:	**Title:**	**Organization:**
Derrick Golden	Former Hocomonco Remedial Project Manager	USEPA Region I

Telephone No: 617-918-1448 **Fax No:** 617- 918-0448 **E-Mail Address:** golden.derrick@epa.gov	**Street Address:** 1 Congress Street, Suite 1100 Boston, MA 02114

1.A. What is your overall impression of the project? (general sentiment)

The Hocomonco Pond Superfund site is in the final phase of the Superfund process. I.E. DNAPL recovery, long term monitoring and sampling and maintenance of the landfill and lagoon caps/cover.

2.A. What effects have site operations had on the surrounding community?

Minimal, the site is in the final phase of the Superfund process.

3.A. Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details.

The Town of Westborough currently owns the site/property. The long term plans of the Town include preserving the property as open space for passive recreational activities, i.e., walking trail. Another component of the plans includes removing the perimeter site fence so access to the site is not restricted.

4.A. Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details.

No, not to my knowledge.

5.A. Do you feel well informed about the site's activities and progress?

Yes, I was the EPA Remedial Project Manager (RPM) from 1997 through November 2007 and I still occasionally touch base with the current RPM on the Hocomonco Pond project.

6.A. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?

The DNAPL recovery activities should continue in order to reduce DNAPL mass and source reduction.

The reuse of the property into a passive recreational area would be beneficial to the Town and community.

INTERVIEW RECORD

Site Name: Hocomonco Pond Superfund Site (Westborough, MA)	**EPA ID No.:** MAD980732341	
Subject: Five Year Review	**Time:** 12:45	**Date: 7/27/09**
Type: ☐ Telephone ☐ Visit ■ Other **Location of Visit:** Meeting at M&E's Wakefield office	☐ Incoming ☐ Outgoing	

Contact Made By:

Name:	**Title:**	**Organization:**
Sean Czarniecki	Project Engineer	Metcalf &Eddy, Inc

Individual Contacted:

Name:	**Title:**	**Organization:**
Jay Naparstek	State Remedial Project Manager	Massachusetts Department of Environmental Protection
Telephone No: 617-292-5697 **Fax No:** **E-Mail Address:** jay.naparstek@state.ma.us	**Street Address:** 1 Winter Street Boston, MA 02108	

1.A. What is your overall impression of the project? (general sentiment)

Mr. Naparstek stated that, other than the issues associated with DNAPL and groundwater recovery, the project is going well.

2.A. Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please give purpose and results.

Mr. Naparstek has performed site visits in combination with EPA generally associated with 5-year reviews and site inspections.

3.A. Have there been any complaints, violations, or other incidents related to the site requiring response by your office? If so, give details of the events and results of the responses.

Mr. Naparstek stated none that he is aware of.

4.A. Do you feel well informed about the site's activities and progress?

Mr. Naparstek feels well-informed.

5.A. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?

Mr. Naparstek stated that there needs to be a better long-term monitoring plan and O&M plan. There also needs to be better information generated on approaches to DNAPL recovery and groundwater issues.

INTERVIEW RECORD

Site Name: Hocomonco Pond Superfund Site (Westborough, MA)	**EPA ID No.:** MAD980732341	
Subject: Five Year Review	**Time:** 12:45 PM	**Date:** 7/27/09
Type: ☐ Telephone ☐ Visit ■ Other **Location of Visit:** Meeting at M&E's Wakefield office	☐ Incoming ☐ Outgoing	

Contact Made By:		
Name: Cindy Castleberry	**Title:** Task Order Manager	**Organization:** Metcalf &Eddy, Inc

Individual Contacted:		
Name: Steve Mangion	**Title:** Hydrologist	**Organization:** EPA Region I Office of Research and Development (ORD)
Telephone No: **Fax No:** **E-Mail Address:** mangion.steve@epamail.epa.gov	**Street Address:**	

1.A. What is your overall impression of the project? (general sentiment)

Mr. Mangion stated that the project needs to implement additional measures for recovery of free phase DNAPL and dissolved contamination.

2.A. What effects have site operations had on the surrounding community?

Mr. Mangion stated that he is not aware of any effects.

3.A. Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details.

Mr Mangion stated that he does not have personal knowledge, but that he understands the town of Westborough is interested in utilizing the groundwater treatment building.

4.A. Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details.

Mr. Mangion is not aware of any incidents.

5.A. Do you feel well informed about the site's activities and progress?

Mr. Mangion stated that he does feel well informed through working with the project team including EPA and MassDEP.

6.A. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?

Mr. Mangion stated that in order to implement his recommendation in the response to question #1, additional site characterization is needed.

INTERVIEW RECORD

Site Name: Hocomonco Pond Superfund Site (Westborough, MA)	**EPA ID No.:** MAD980732341	
Subject: Five Year Review	**Time:** 10:30 AM	**Date: 7/23/09**
Type: ■ Telephone ☐ Visit ☐ Other **Location of Visit:** Hocomonco Pond site	☐ Incoming ☐ Outgoing	

Contact Made By:

Name:	**Title:**	**Organization:**
Cindy Castleberry	Task Order Manager	Metcalf &Eddy, Inc

Individual Contacted:

Name:	**Title:**	**Organization:**
Bart Hoskins	Ecological Risk Assessor	USEPA Region I

Telephone No: 617-918-8375 **Fax No:** **E-Mail Address:** Hoskins.bart@epamail.epa.gov	**Street Address:** 1 Congress Street, Suite 1100 Boston, MA 02114

1.A. What is your overall impression of the project? (general sentiment)

Mr. Hoskins stated that the situation is not perfect (i.e. significant contamination remains) but that it is stable. Monitoring needs to continue to make sure that site continues to be stable.

2.A. What effects have site operations had on the surrounding community?

Mr. Hoskins stated that he is aware that the Town would like to use the property and that decisions need to first be made by EPA.

3.A. Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details.

Mr. Hoskins stated that he is not aware of any concerns.

4.A. Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details.

Mr. Hoskins stated that he is not aware of any incidents.

5.A. Do you feel well informed about the site's activities and progress?

Mr. Hoskins does feel well informed about the site.

6.A. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?

Mr. Hoskins stated that he does not have comments at this time but that he has made suggestions and recommendations that were acted upon.

APPENDIX D

GROUNDWATER MONITORING AND DNAPL RECOVERY

Table D-1. Summary of Detected Analytes in Groundwater Near the Former Lagoon
October 2004 through November 2008
Hocomonco Pond Site
Westborough, Massachusetts

Sample ID	MLC-2				MLC-3				MLC-4					GW-1
Sample Date	10/28/04	11/13/06	11/13/07	11/11/08	10/28/04	11/13/06	11/13/07	11/11/08	10/28/04	11/13/06	11/13/07	11/11/08	IGCL	Standards
VOCs														
Benzene	13.2	11.3	4.4	7.9	NA	67.1	64.3	36.1	NA	0.50 U	0.50 U	0.50 U	5	5
Ethylbenzene	12	14.5	7.2	10	NA	25.2	21.6	11.1	NA	1.0 U	1.0 U	1.0 U	700	700
Toluene	33.4	36.4	18.3	22.7	NA	35.5	39.3	18.1	NA	1.0 U	1.0 U	1.0 U	1,000	1,000
Xylenes (total)	51.2	59.7	28.3	37.4	NA	63.3	51.6	23.7	NA	1.0 U	1.0 U	1.0 U	10,000	10,000
SVOCs														
2-Methylnaphthalene	NA	5.1 U	23.6	24.1	NA	122	31.7	46.2	NA	5.5 U	5.3 U	5.4 U	None*	10
Acenaphthene	12.7	17.8	17.5	23.8	21.4	37.8	20.8	23.3	2.5 J	5.5	5.3 U	5.4 U	2,200	20
Acenaphthylene	1.8 J	5.1 U	1 J	1.9 J	2.6 J	5.3 U	2 J	2.4 J	5.0 U	5.5 U	5.3 U	5.4 U	None	30
Benzo(a)pyrene	5 U	5.1 U	5.3 U	5.3 U	5 U	5.3 U	5 U	5.3 U	5.0 U	5.5 U	5.3 U	5.4 U	0.2	0.2
Fluorene	7.2	8.6	15.3	13.3	2.3 J	5.3 U	1.3 J	1.1 J	5.0 U	5.5 U	5.3 U	5.4 U	1,500	30
Naphthalene	1,240 D	2,230	1,680	2,110	691 D	1630	861	811	75.1	188	10.3	5.4 U	1,500	140
Phenanthrene	18.5	9.8	13.3	9.9	5.0 U	5.3 U	5.0 U	5.3 U	5.0 U	5.5 U	5.3 U	5.4 U	None	40

Notes:
All data presented in micrograms per liter (ug/L)
GW-1 Standards obtained from 310 CMR 40.0974(2) MCP Method 1 Groundwater Standards as viewed at www.mass.gov on 05/11/2009
* 2-methylnaphthalene was not included in the original development of IGCLs. See text for further discussion.
J = The compound was identified; however, the associated numerical value is an estimated concentration.
U = Compound not detected above reported sample quantitation limit.
NA = Not analyzed
D = Concentration determined after sample dilution.
Results for MLC-3 on 11/11/08 are an average of field duplicates
IGCL - Interim Groundwater Cleanup Level
Source: Bollinger, 2009

Table D-2. Volume of DNAPL Recovered (gallons) During Passive Operation Mode - 2003 through 2009

Hocomonco Pond Site

Westborough, Massachusetts

Well	Dec-03	Jan-04	Feb-04	Mar-04	Apr-04	May-04	Jun-04	Jul-04	Aug-04	Sep-04	Oct-04	Nov-04	Dec-04	Jan-05	Feb-05
DRW-1	7.26	0	4.84	0	0	2.42	0	4.84	0	4.84	0	0	0	7.26	0
DRW-2	70.18	19.36	30.25	16.94	70.18	33.88	31.46	19.36	16.94	24.2	33.88	12.1	21.78	36.3	26.62
DRW-3	1.74	1.74	2.61	0	1.74	1.74	1.74	0	3.48	0.87	2.61	2.61	1.74	5.22	0.87
A-2	1.74	0	7.83	11.31	6.09	3.48	6.96	4.35	3.48	4.35	7.83	2.61	4.35	2.61	3.48
A-4	75.02	0	31.46	24.2	67.76	36.3	67.76	14.52	43.56	36.3	43.56	36.3	45.98	26.62	21.78
A-10	14.79	7.83	4.35	4.35	8.7	6.96	7.83	4.35	6.96	12.18	7.83	10.44	7.83	6.96	10.44
BRW-5	0	0	2	1.25	1.5	1	0.5	0	0	0.25	0	0	0.75	0.5	0
BMW-6	0.25	0	1	0.5	0	0.5	0.75	0.5	0	0	0.25	0	0.5	0.5	0
M-16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	170.98	28.93	84.34	58.55	155.97	86.28	117	47.92	74.42	82.99	95.96	64.06	82.93	85.97	63.19

Notes

* *4 ounces of DNAPL also removed from M-16 in December 2003*

** Product lines frozen preventing collection of DNAPL in January 2004

Source: Monthly reports by BBL and Arcadis BBL, September 13, 2004 through June 12, 2009

Table D-2. Volume of DNAPL Recovered (gallons) During Passive Operation Mode - 2003 through 2009
Hocomonco Pond Site
Westborough, Massachusetts

Well	Mar-05	Apr-05	May-05	Jun-05	Jul-05	Aug-05	Sep-05	Oct-05	Nov-05	Dec-05	Jan-06	Feb-06	Mar-06	Apr-06	May-06
DRW-1	4.84	4.84	4.84	4.84	9.68	4.84	9.68	14.52	7.26	6.05	15.12	6.05	16.94	10.89	13.31
DRW-2	79.86	16.94	35.09	9.68	19.36	45.98	29.04	22.99	24.2	14.52	31.46	24.2	25.41	12.97	26.62
DRW-3	2.61	3.48	1.74	2.61	1.74	1.74	1.74	1.74	0.87	1.74	2.61	0.87	3.47	1.74	0
A-2	6.09	4.35	3.48	2.61	3.48	3.48	2.61	3.48	2.61	0	0.92	3.48	1.74	5.22	2.17
A-4	9.68	36.3	26.62	9.68	21.78	27.58	38.72	41.22	36.3	12.1	15.73	24.2	14.52	21.78	18.15
A-10	5.22	8.7	4.35	3.48	4.35	6.96	9.57	12.61	3.04	0	8.7	5.2	3.91	3.91	6.95
BRW-5	0.75	0.5	0.75	0	0.75	0.75	0.5	0	1	0	0.75	0	0.75	1	0
BMW-6	0.5	0.5	0	0.5	0.75	0	0.5	0	0	0.75	0.75	0	0	0.75	0
M-16	0	0	0	57	16	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Volume	109.55	75.61	76.87	90.4	77.89	91.33	92.36	96.56	75.28	35.16	76.04	64	66.74	58.26	67.2

Notes
M-16 abandoned prior to August 2005 measurements

Table D-2. Volume of DNAPL Recovered (gallons) During Passive Operation Mode - 2003 through 2009
Hocomonco Pond Site
Westborough, Massachusetts

Well	Jun-06	Jul-06	Aug-06	Sep-06	Oct-06	Nov-06	Dec-06	Jan-07	Feb-07	Mar-07	Apr-07	May-07	Jun-07	Jul-07	Aug-07
DRW-1	8.47	8.47	9.54	9.68	0	0	19.36	0	4.24	3.95	2.89	3.89	0	4.09	3.54
DRW-2	55.66	33.88	11.44	26.62	50.82	41.34	65.34	14.53	17.55	14.08	12.97	14.03	19.75	32.01	31.99
DRW-3	0	2.61	1.74	1.74	0	0	0	0	0	0	0	4.01	0	3.97	0
A-2	5.22	1.74	1.74	2.61	2.61	4.35	0	0	0	0	0	0	5.89	0	0
A-4	14.52	14.52	17.75	19.36	0	24.2	0	1.82	19.97	16.15	16.22	19.58	21.88	35.62	35.35
A-10	4.35	5.65	3.89	5.22	6.09	5.22	0	5.22	2.83	4.26	10.89	4.11	4.77	4.42	4.07
BRW-5	0.75	0	0	4.5	0	0	0	0	0	0	0	0	0	0	0
BMW-6	0.5	0	0.5	1.5	0	0	0	0	0	0	0	0	0	0	0
M-16	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Volume	89.47	66.87	46.6	71.23	59.52	75.11	84.7	21.57	44.59	38.44	42.97	45.62	52.29	80.11	74.95

Table D-2. Volume of DNAPL Recovered (gallons) During Passive Operation Mode - 2003 through 2009

Hocomonco Pond Site

Westborough, Massachusetts

Well	Sep-07	Oct-07	Nov-07	Dec-07	Jan-08	Feb-08	Mar-08	Apr-08	May-08	Jun-08	Jul-08	Aug-08	Sep-08	Oct-08	Nov-08
DRW-1	0	0	3.94	0	40.09	0	12.53	0	9.66	10.44	10.44	11.22	0	12.01	20.36
DRW-2	26.83	20.55	15.06	12.9	63.87	50.33	40.77	41.25	50.37	36.02	31.85	24.53	39.94	15.66	46.2
DRW-3	3.68	0	0	0	16.15	0	0	0	0	0	0	0	10.96	0	0
A-2	0	0	0	11.06	0	5.22	7.5	0	0	0	0	16	0	0	0
A-4	30.22	25.01	19.47	16.87	30.41	21.49	18.96	6.62	17.64	7.35	11.76	6.91	6.88	15.58	12.93
A-10	0	0	4.22	0	9.97	6.16	7.64	6.32	0	6.17	13.08	0	13.38	5.88	12.94
BRW-5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BMW-6	0	0	0	0	0	0	14.12	0	0	0	0	0	0	0	0
M-16	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Volume	60.73	45.56	42.69	40.83	160.49	83.2	101.52	54.19	77.67	59.98	67.13	58.66	71.16	49.13	92.43

Table D-2. Volume of DNAPL Recovered (gallons) During Passive Operation Mode - 2003 through 2009

Hocomonco Pond Site

Westborough, Massachusetts

Well	Dec-08	Jan-09	Feb-09	Mar-09	Apr-09	May-09
DRW-1	10.44	0	11.48	15.66	10.96	10.96
DRW-2	26.1	29.96	35.25	49.32	27.14	17.75
DRW-3	10.96	0	0	0	0	11.75
A-2	0	0	0	0	0	0
A-4	16.69	23.28	12.94	26.46	12.2	8.67
A-10	0	6.17	0	6.62	0	6.32
BRW-5	0	0	0	0	0	0
BMW-6	0	0	0	0	0	0
M-16	NA	NA	NA	NA	NA	NA
Total Volume	64.19	59.41	59.67	98.06	50.3	55.45

Table D-3. Recorded DNAPL Thickness
November 2000 through November 2008
Hocomonco Pond Site
Westborough, Massachusetts

Well	Nov-00	Jun-01	Nov-01	May-02	Oct-02	May-03	Oct-03	May-04	Oct-04	May-05	Nov-06	Nov-07	Nov-08
	Apparent DNAPL Thickness (feet)												
DRW-1	0.25	0.61	0.42	0.27	1.58	1.87	0.87	0.8	1.09	0.98	2.9	2.07	3.92
DRW-2	0.22	0.65	0.52	0.5	5.93	8.84	1.6	1.4	2.23	3.57	8.62	1.45	3.51
DRW-3	0.42	0.17	0.32	0.43	0.24	2.05	0.63	1.18	0.9	1.23	1.65	1.23	4.49
BMW-4	ND	Trace	ND	ND	ND	ND	0.48	0.59	0.63	0.57	0.59	0.6	0.82
BMW-6	0.45	1.88	3.28	2.15	2.27	2.8	0.78	2.56	0.97	0.89	0.88	2.21	2.14
BRW-1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.9	ND	ND
BRW-2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	8.62	ND	ND
BRW-3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.65	ND	ND
BRW-4	ND	Trace	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BRW-5	ND	0.75	0.58	1.38	0.9	0.92	0.6	1.31	0.93	0.9	1.34	1.97	1.82
A-2	13	NM	NM	9	12.96	Trace	NM	NM	NM	NM	NM	NM	NM
A-4	9.2	10.25	9.97	12.72	10.07	17.43	4.65	3.72	3.37	2.41	2.21	1.86	2.11
A-6	ND	4.95	ND	ND	ND	ND	ND	ND	ND	ND	0.04	ND	ND
A-8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.02	Trace	Trace
A-10	0.45	0.28	0.56	0.55	0.24	3.15	0.65	1.18	1.52	1.43	2.29	1.59	0.47
M-11D	Trace	5.25	5.1	5.65	5.46	5.64	0.51	1.4	0.34	0.39	0.24	0.31	0.41
M-12S	2.82	3.5	3.9	1.21	4.27	4.01	0.47	ND	ND	0.57	0.06	0.38	0.36
M-16	ND	Trace	1.03	1.17	2.12	2.2	1.07	1.6	0.9	NA	NA	NA	NA

Notes
ND = not detected
NM = not measured
NA = not available
M-16 abandoned Aug-2005
A-2 abandoned (date unknown, but it appears to be 2003 due to an obstruction in well)
Sources: BBL, 2005 (Nov-2000 to May-2005); Bollinger, 2009

Table D-4. Exceedances of Interim Groundwater Cleanup Levels
Hocomonco Pond Site
Westborough, Massachusetts

Well / Analyte	Nov. 2000	June 2001	Nov. 2001	May 2002	Oct. 2002	May 2003	Oct. 2003	May 2004	Oct. 2004	May 2005	Nov. 2006	Nov. 2007	Nov. 2008	IGCL
	Groundwater Concentrations (µg/l)													
M-15S														
Benzene	62	42	<100	3.8	65.9	50.5	16.4	26.6	48.7	47.5	NS	NS	NS	5
Naphthalene	9,600	5,010	8,760	1,150	5,570	5,260	4,960	7,190	11,300	5,260	NS	NS	NS	1,500
M-15D														
Benzene	<50	10	<100	37.8	15.8	10.1	11.6	5.8	6.3	3.7	NS	NS	NS	5
Naphthalene	10,000	10,100	9,980	8,420	10,700	9,170	8,580	17,400	8,010	5,370	NS	NS	NS	1,500
MLC-2														
Benzene	5.6	NS	20.1 (avg)	NS	12.3*	NS	22.6	NS	13.2	NS	11.3	4.4	7.9	5
Naphthalene	2,000	NS	4,165 (avg)	NS	4,730 (avg)	NS	1,630	NS	1,240	NS	2,230	1,680	2,110	1,500
MLC-3														
Benzene	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	67.1	64.3	36.1 (avg)	5
Naphthalene	NS	NS	NS	NS	NS	NS	NS	NS	691	NS	1,630	861	811 (avg)	1,500
MLC-4														
Naphthalene	NS	NS	NS	NS	NS	NS	NS	NS	75.1	NS	188	10.3	<5.4	1,500

Notes
* Sample collected in December 2002
NS = Not sampled/analyzed for this chemical
avg = Average of duplicate samples
IGCL = Interim Groundwater Cleanup Level
Sources: BBL, 2005 (Nov-2000 to May-2005); Bollinger, 2009

APPENDIX E

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS)

HOCOMONCO POND SUPERFUND SITE
WESTBOROUGH, MASSACHUSETTS

ACTION SPECIFIC ARARS
TABLE E-1

Requirement	Status	Requirement Synopsis	Five-Year Review
Landfills			
Federal			
RCRA – Closure and Post-Closure (40 CFR 264.110-264.120)	Relevant and Appropriate	This regulation details specific requirements for closure and post- closure of hazardous waste facilities.	These requirements remain relevant and appropriate for the former lagoon cap and on-site landfill. The landfill construction was designed to meet the requirements for landfill closure. Post-closure operations, maintenance and monitoring are currently being performed.
RCRA – Landfill Closure and Post-Closure Care (40 CFR 264.310)	Relevant and Appropriate	This regulation provides additional closure and post-closure care requirements specific to hazardous waste landfills.	These requirements remain relevant and appropriate for the former lagoon cap and on-site landfill. The landfill construction was designed to meet the requirements for landfill closure. Post-closure operations, maintenance and monitoring are currently being performed.
State			
Massachusetts Closure and Post-closure (310 CMR 30.580-595)	Relevant and Appropriate	This requirement details the specific requirements for closure and post-closure of hazardous waste facilities.	These requirements remain relevant and appropriate. Post-closure operations, maintenance and monitoring are currently being performed. The landfill construction was designed to meet RCRA requirements.
Massachusetts - Landfills (310 CMR 30.620-633)	Relevant and Appropriate	Establishes requirements for construction, operation, monitoring, and maintenance of hazardous waste landfills.	These requirements remain relevant and appropriate for the former lagoon cap and on-site landfill. The landfill construction was designed to meet the requirements for landfill closure. Post-closure operations, maintenance and monitoring are currently being performed.

#59591

HOCOMONCO POND SUPERFUND SITE
WESTBOROUGH, MASSACHUSETTS

ACTION SPECIFIC ARARS
TABLE E-1

Requirement	Status	Requirement Synopsis	Five-Year Review
Wetlands and Floodplains			
Federal			
Executive Order 11990 (Protection of Wetlands)	Applicable	Federal agencies are required to minimize destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial values of the wetland.	The 1985 ROD included a Statement of Findings for the proposed remedial actions that were in or might potentially affect a 100-year floodplain and/or wetland. There was no practical alternative to address the contaminated sediments/soil and measures were taken to minimize impacts. Any future work impacting wetlands would need to comply with this requirement.
Executive Order 11988 (Floodplain Management)	Applicable	Federal agencies are required to reduce the risk of flood loss, minimize the impact of floods, and restore and preserve the natural and beneficial values of the floodplains.	The 1985 ROD included a Statement of Findings for the proposed remedial actions that were in or might potentially affect a 100-year floodplain and/or wetland. There was no practical alternative to address the contaminated sediments/soil and measures were taken to minimize impacts. Any future work impacting the 100-year floodplain would need to comply with this requirement.

ACTION SPECIFIC ARARS
TABLE E-1

Requirement	Status	Requirement Synopsis	Five-Year Review
State			
Wetlands Protection Act 310 CMR 10.00 310 CMR 10.53(3)(q)(2)	Applicable	Clean up activities at hazardous waste sites shall avoid, or where avoidance is not practical, minimize impacts to resource areas, and meet the following performance standards: minimal hydrologic impacts, use of BMPs to control erosion and sedimentation, other mitigating measures, compensatory flood storage, removal of temporary structures within 30 days after completion of work, restoration of vegetation. Applicable resource areas at the site include bordering vegetated wetland and land subject to flooding banks.	The 1985 ROD included a Statement of Findings for the proposed remedial actions that were in or might potentially affect a 100-year floodplain and/or wetland. There was no practical alternative to address the contaminated sediments/soil and measures were taken to minimize impacts. Any future work impacting the 100-year floodplain or wetlands would need to comply with this requirement.
Certification for Dredging, Dredged Material Disposal and Filling Waters 314 CMR 9.00, MGL ch 21 ss 26-53	Applicable	Three categories have been established for dredge or fill material based on the chemical constituents. Approved methods for dredging, handling and disposal options for the three categories must be met.	Numerous changes have been made to this regulation since remedy implementation, which included sediment dredging and on-site disposal activities between 1994 and 1996. Any future dredging activities would need to comply with this regulation.
Water			
Federal			
Clean Water Act: 402 (NPDES) 40 CFR 122, 125	Applicable	Any point-source discharge to waters of the United States must meet NPDES substantive permitting requirements, which include compliance with corresponding water quality standards and establishment of discharge monitoring systems.	Previous operation of the groundwater treatment plant and discharge to Hocomonco Pond complied with effluent criteria developed based on EPA "Gold Book" criteria. Monitoring of effluent quality was conducted. Should the groundwater treatment plant operate in the future, discharges of treated groundwater to Hocomonco Pond would need to comply with the substantive requirements of this regulation.

HOCOMONCO POND SUPERFUND SITE
WESTBOROUGH, MASSACHUSETTS

ACTION SPECIFIC ARARS
TABLE E-1

Requirement	Status	Requirement Synopsis	Five-Year Review
Clean Water Act: 33 USC 1251-1376 Ambient Water Quality Criteria (AWQC) 40 CFR 131	Applicable	AWQC protect aquatic life and human health. AWQC include 1) health-based criteria for carcinogenic and non-carcinogenic compounds and 2) water quality parameters. AWQC were considered in characterizing public health risks and risks to aquatic organisms due to contaminant concentrations in surface water and sediment at the Continuing Source Areas as defined in the OU #3 ROD. Because this water is not used as a drinking water source, the criteria developed for aquatic organisms protection and ingestion of contaminated aquatic organisms were considered. The clean-up level of 1 mg/kg of mercury in sediment is expected to result in surface water, which meets AWQC.	Previous operation of the groundwater treatment plant and discharge to Hocomonco Pond complied with effluent criteria developed based on EPA "Gold Book" criteria. Should the groundwater treatment plant operate in the future, discharges of treated groundwater to Hocomonco Pond would need to comply with the substantive requirements of this regulation.
State			
Surface Water Discharge Permit Program 314 CMR 3.00	Applicable	Any point source discharge must meet substantive permitting requirements, which include attainment of water quality based effluent limitations and monitoring. In establishing effluent limitations the DEP must consider natural background conditions, existing discharges, and protect downstream uses.	Previous operation of the groundwater treatment plant and discharge to Hocomonco Pond complied with effluent criteria developed based on EPA "Gold Book" criteria. Should the groundwater treatment plant operate in the future, discharges of treated groundwater to Hocomonco Pond would need to comply with the substantive requirements of this regulation.

HOCOMONCO POND SUPERFUND SITE
WESTBOROUGH, MASSACHUSETTS

ACTION SPECIFIC ARARS
TABLE E-1

Requirement	Status	Requirement Synopsis	Five-Year Review
Massachusetts Surface Water Quality Standards 314 CMR 4.05	Applicable	DEP Surface Water Quality Standards are given for dissolved oxygen, temperature increase, pH and total coliform and there is a narrative requirement for toxicants in toxic amounts. In the absence of a state standard for a compound, federal AWQC would be appropriate.	Previous operation of the groundwater treatment plant and discharge to Hocomonco Pond complied with effluent criteria developed based on EPA "Gold Book" criteria. Should the groundwater treatment plant operate in the future, discharges of treated groundwater to Hocomonco Pond would need to comply with the substantive requirements of this regulation.
Groundwater Discharge Permit Program 314 CMR 5.00	Applicable	These regulations require a permit for any activity, which may result, directly or indirectly, in the discharge pollutants to groundwater.	This requirement was applicable to the re-injection of treated groundwater that occurred briefly as part of the bioremediation activities in the Kettle Pond area. The groundwater treatment plant is not currently operating; however, should groundwater treatment occur in the future, discharge would likely occur to surface water at Hocomonco Pond rather than groundwater.

Monitoring and Sampling

Federal			
RCRA Subpart F - Groundwater Protection 40 CFR 264.90-264.109	Relevant and Appropriate	This regulation details requirements for a groundwater-monitoring program to be performed at the site.	Groundwater Protection Standards remain relevant and appropriate due to the on-site RCRA double-lined landfill. A groundwater monitoring program has been implemented and should continue to assess compliance with these standards.

HOCOMONCO POND SUPERFUND SITE
WESTBOROUGH, MASSACHUSETTS

LOCATION SPECIFIC ARARS
TABLE E-2

Requirement	Status	Requirement Synopsis	Five-Year Review
Wetlands and Floodplains			
Federal			
Executive Order 11990 (Protection of Wetlands)	Applicable	Federal agencies are required to minimize destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial values of the wetland.	The 1985 ROD included a Statement of Findings for the proposed remedial actions that were in or might potentially affect a 100-year floodplain and/or wetland. There was no practical alternative to address the contaminated sediments/soil and measures were taken to minimize impacts. Any future work impacting wetlands would need to comply with this requirement.
RCRA Location Standards 40 CFR 264.18 (b)	Applicable	RCRA defined listed or characteristic hazardous waste (40 CFR 261) facility must be designed, constructed, operated and maintained to prevent washout by 100 year flood.	This ARAR has been met. The on-site RCRA landfill cap and groundwater treatment plant are located outside of the 100-year flood plain.
Clean Water Act: Section 404 40 CFR 230; 33 CFR 320-330	Applicable	No activity that adversely affects a wetland shall be permitted if a practicable alternative that has less effect is available. During identification, screening, and evaluation of alternatives, the effects on wetlands are evaluated. Wetland impacts must be avoided, minimized, mitigated.	The 1985 ROD included a Statement of Findings for the proposed remedial actions that were in or might potentially affect a 100-year floodplain and/or wetland. There was no practical alternative to address the contaminated sediments/soil and measures were taken to minimize impacts. Any future work impacting wetlands would need to comply with this requirement.

LOCATION SPECIFIC ARARS
TABLE E-2

Requirement	Status	Requirement Synopsis	Five-Year Review
Executive Order 11988 (Floodplain Management)	Applicable	Federal agencies are required to reduce the risk of flood loss, minimize the impact of floods, and restore and preserve the natural and beneficial values of the floodplains.	The 1985 ROD included a Statement of Findings for the proposed remedial actions that were in or might potentially affect a 100-year floodplain and/or wetland. There was no practical alternative to address the contaminated sediments/soil and measures were taken to minimize impacts. The on-site groundwater treatment plant and RCRA landfill were constructed outside of the 100-year floodplain. Any future work impacting the 100-year floodplain would need to comply with this requirement.
State			
Wetlands Protection Act 310 CMR 10.00 310 CMR 10.53(3)(q)(2) 310 CMR 10.57 (2), 10.04	Applicable	Clean up activities at hazardous waste sites shall avoid, or where avoidance is not practical, minimize impacts to resource areas, and meet the following performance standards: minimal hydrologic impacts, use of BMPs to control erosion and sedimentation, other mitigating measures, compensatory flood storage, removal of temporary structures within 30 days after completion of work, restoration of vegetation. Applicable resource areas at the site include bordering vegetated wetland and land subject to flooding banks.	The 1985 ROD included a Statement of Findings for the proposed remedial actions that were in or might potentially affect a 100-year floodplain and/or wetland. There was no practical alternative to address the contaminated sediments/soil and measures were taken to minimize impacts. Any future work impacting wetlands would need to comply with this requirement.

LOCATION SPECIFIC ARARS
TABLE E-2

Requirement	Status	Requirement Synopsis	Five-Year Review
		Actions in "bordering land subject to flooding" shall provide compensatory storage for flood storage volume lost as a result of the project, shall not restrict flows so as to cause an increase in flood stage or velocity, and shall not impair it's capability to provide important wildlife habitat functions or alter vernal pool habitat. Actions in isolated land subject to flooding shall not result in flood damage.	

HOCOMONCO POND SUPERFUND SITE
WESTBOROUGH, MASSACHUSETTS

CHEMICAL SPECIFIC ARARS
TABLE E-3

Requirement	Status	Requirement Synopsis	Five-Year Review
Monitoring and Sampling			
Federal			
SDWA-Maximum Contaminant Levels (MCLs) (40 CFR 141.11-141.16)	Relevant and Appropriate	MCLs have been promulgated for a number of common organic and inorganic analytes. These levels regulate the concentration in drinking water supplies, but may also be considered relevant and appropriate for groundwater aquifers used for drinking water. The Hocomonco Pond site is located within a Zone II aquifer.	MCLs are considered relevant and appropriate for site groundwater outside of the TI waiver zones. Since the interim groundwater cleanup levels were established, the MCL for arsenic was lowered from 50 ug/l to 10 ug/l. Arsenic is not included in the long-term monitoring program and should be added to the sampling program to assess compliance with the IGCL and the lower MCL for arsenic. Site groundwater requires continued monitoring to assess compliance with MCLs. MCLs are still exceeded for some contaminants, including benzene and naphthalene, outside of the TI Waiver zones. Further, the detection limit for benzo(a)pyrene in the long-term groundwater monitoring data through 2008 is significantly above the MCL and therefore, compliance with the MCL cannot be confirmed.
SDWA-Maximum Contaminant Level Goals (MCLGs) (40 CFR 143)	Relevant and Appropriate	MCLGs are health-based criteria that under CERCLA are relevant and appropriate for potential drinking water sources.	Non-zero MCLGs are considered relevant and appropriate for site groundwater outside of the TI waiver zones. There have been no changes to non-zero MCLGs since the interim groundwater cleanup levels were established for site contaminants.

HOCOMONCO POND SUPERFUND SITE
WESTBOROUGH, MASSACHUSETTS

CHEMICAL SPECIFIC ARARS
TABLE E-3

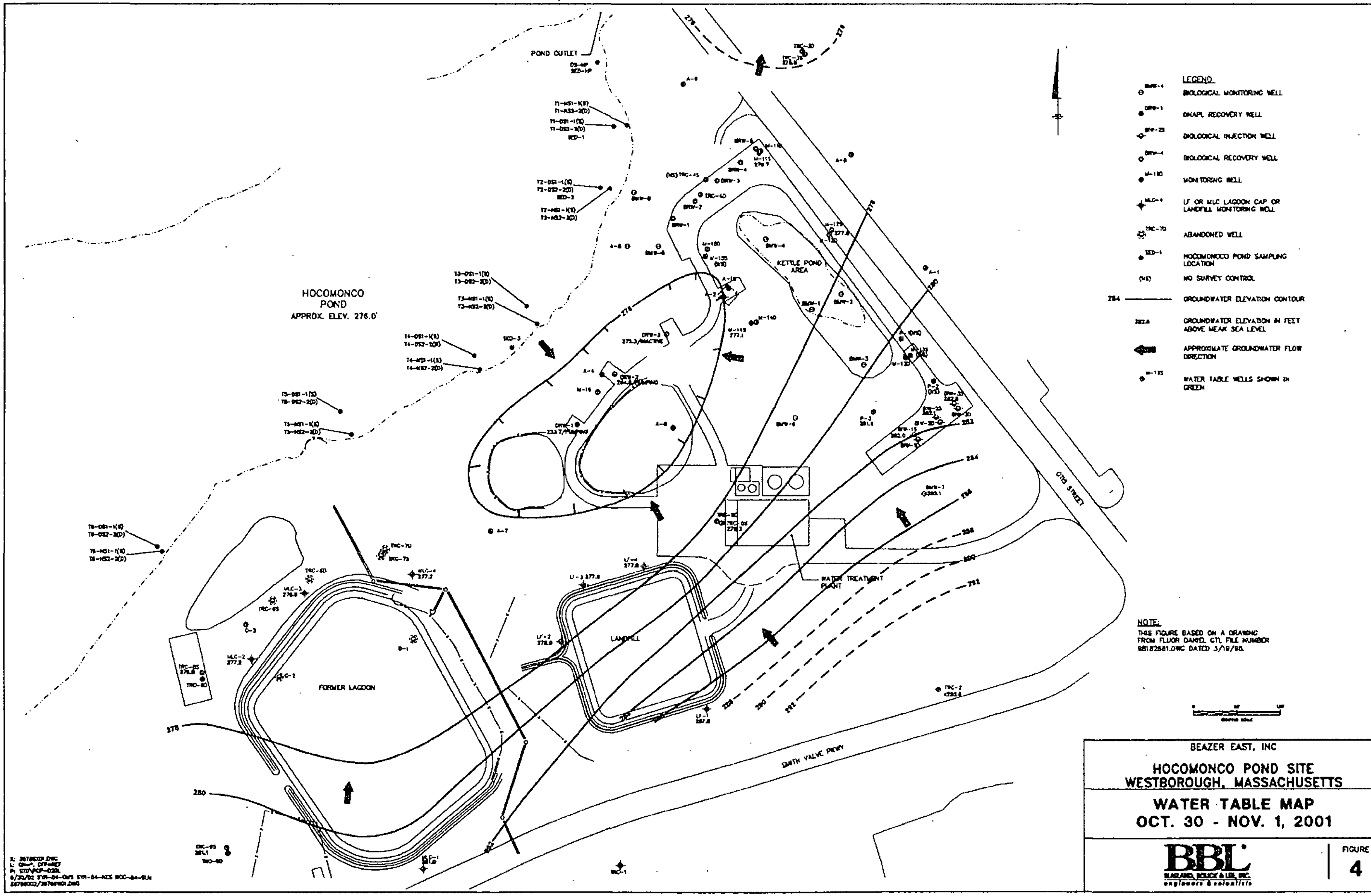
Requirement	Status	Requirement Synopsis	Five-Year Review
RCRA-Subpart F, Groundwater Protection Standards, Concentration Limits 40 CFR 264.94(a)	Relevant and Appropriate	The groundwater protection regulations require the setting of groundwater protection standards, which must be protective of the public's health and the environment. RCRA standards for 14 toxic compounds have been adopted as part of RCRA groundwater protection standards. These limits were originally set as MCLs. RCRA sets the limit for organic constituents at background levels.	Groundwater Protection Standards remain relevant and appropriate due to the on-site RCRA double-lined landfill. A groundwater monitoring program has been implemented and should continue to assess compliance with these standards.
EPA Risk Reference Doses (RfDs)	TBC	Dose levels established to characterize risks due to exposure to contaminants in surface water, sediment as well as other media in terms of non-carcinogenic effects.	These values were used in risk calculations and should be used in any future calculations.
EPA Carcinogenic Slope Factors	TBC	Used to compute the individual incremental cancer risk resulting from exposure to carcinogens.	These values were used in risk calculations and should be used in any future calculations.
EPA Health Advisories and Acceptable Health Assessment Documents	TBC	Intended for use in qualitative public health evaluation of remedial alternatives.	Health advisories were considered for risk characterization and should be used in any future calculations.
EPA Office of Water Guidance, Water Related Fate of 129 Priority Pollutants (1979)	TBC	This guidance document gives fate and transport information for 129 priority pollutants	This guidance was considered for risk characterization and should be used in any future calculations.
EPA Interim Sediment Criteria Values for Nonpolar Hydrophobic Organic Contaminants (U.S. EPA, May 1988)	TBC	These criteria were developed by EPA for certain hydrophobic organic compounds, including PAHs. These criteria represent levels protective of aquatic life.	These criteria were considered in the selection of COPCs for the risk characterizations. These criteria were never finalized and are no longer used. The technical basis remains a scientifically defensible approach for setting sediment quality criteria.

CHEMICAL SPECIFIC ARARS
TABLE E-3

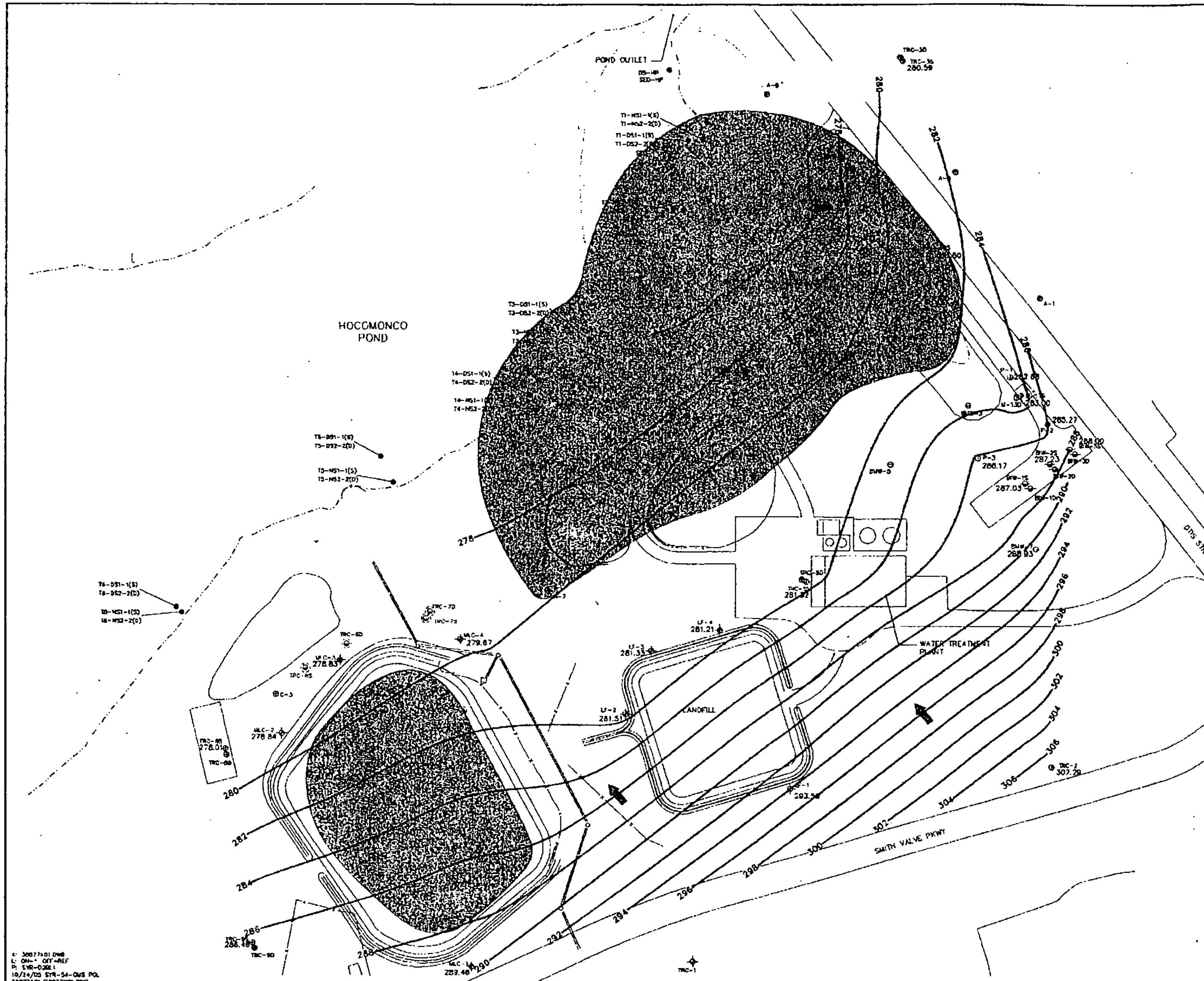
Requirement	Status	Requirement Synopsis	Five-Year Review
State			
Massachusetts Drinking Water Requirements 310 CMR 22.05 to 22.09	Relevant and Appropriate	Massachusetts MCLs (MMCLs) have been promulgated for a number of common organic and inorganic analytes. These levels regulate the concentration of analytes in public drinking water supplies, but may also be considered relevant and appropriate for groundwater aquifers used for drinking water. The Hocomonco Pond site is located within a Zone II aquifer.	MMCLs are considered relevant and appropriate for site groundwater outside of the TI waiver zones. The current MMCL for benzo(a)pyrene is 0 ug/l as compared to the interim groundwater cleanup level for benzo(a)pyrene, which is 0.2 ug/l. Interim groundwater cleanup levels for other contaminants are equal to the current MMCLs, where they exist. Site groundwater requires continued monitoring to assess compliance with MMCLs. MMCLs are still exceeded for some contaminants outside of the TI Waiver zones.

APPENDIX F

GROUNDWATER CONTOUR MAPS



LEGEND
BIOLOGICAL MONITORING WELL
DNAPL RECOVERY WELL
BIOLOGICAL INJECTION WELL
BIOLOGICAL RECOVERY WELL
MONITORING WELL
LF OR MLC LAGOON CAP OR LANDFILL MONITORING WELL
ABANDONED WELL
HOCOMONCO POND SAMPLING LOCATION
(NS) NO SURVEY CONTROL
284 GROUNDWATER ELEVATION CONTOUR
GROUNDWATER ELEVATION IN FEET ABOVE MEAN SEA LEVEL
APPROXIMATE GROUNDWATER FLOW DIRECTION
WATER TABLE WELLS SHOWN IN GREEN
HOCOMONCO POND
APPROX. ELEV. 276.0'
POND OUTLET
KETTLE POND AREA
FORMER LAGOON
LANDFILL
WATER TREATMENT PLANT
OTIS STREET
SMITH VALVE PKWY
NOTE:
THIS FIGURE BASED ON A DRAWING FROM FLUOR DANIEL GTI, FILE NUMBER 98182581.DWG DATED 3/19/98.
BEAZER EAST, INC
HOCOMONCO POND SITE
WESTBOROUGH, MASSACHUSETTS
WATER TABLE MAP
OCT. 30 - NOV. 1, 2001
BBL
BLASLAND, BOUCK & LEE, INC.
engineers & scientists
FIGURE
4



LEGEND:

BIOLOGICAL MONITORING WELL

DNAPL RECOVERY WELL

BIOLOGICAL INJECTION WELL

BIOLOGICAL RECOVERY WELL

MONITORING WELL

LF OR MLC LAGOON CAP OR LANDFILL MONITORING WELL

ABANDONED WELL

HOCOMONOCO POND SAMPLING LOCATION

(NS) NO SURVEY CONTROL

284 GROUNDWATER ELEVATION CONTOUR

287.23 GROUNDWATER ELEVATION IN FEET ABOVE MEAN SEA LEVEL

APPROXIMATE GROUNDWATER FLOW DIRECTION

WATER TABLE WELLS SHOWN IN GREEN

NOTE:
THIS FIGURE BASED ON A DRAWING FROM FLUOR DANIEL GTI, FILE NUMBER 98182881.DWG DATED 3/19/98.

BEAZER EAST, INC

HOCOMONCO POND SITE
WESTBOROUGH, MASSACHUSETTS

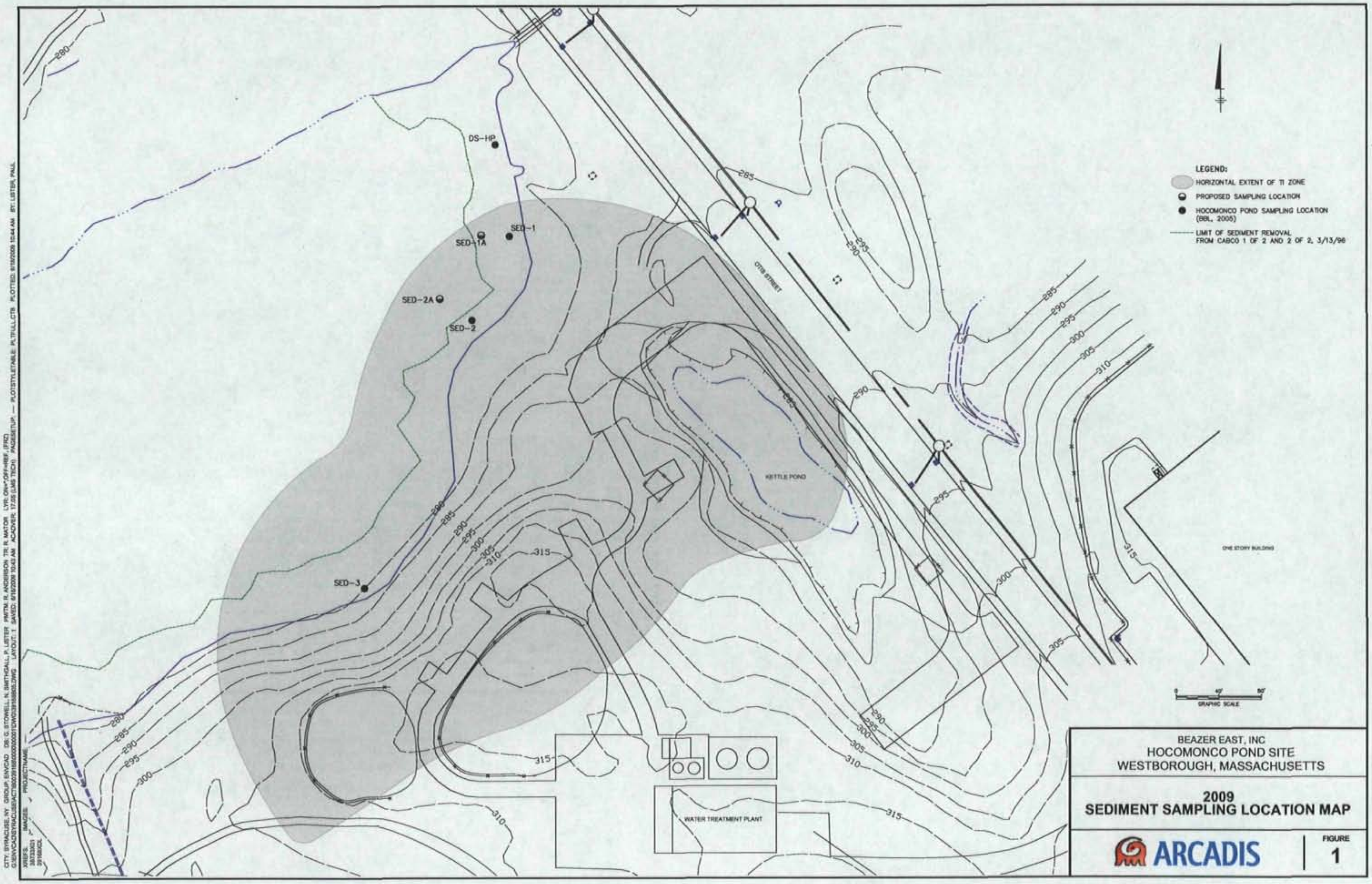
WATER TABLE MAP
MAY 31, 2005

BBL
BLASLAND, BOUCK & LEE, INC.
engineers, scientists, economists

FIGURE
4

APPENDIX G

2009 SEDIMENT SAMPLING RESULTS



BEAZER EAST, INC
HOCOMONCO POND SITE
WESTBOROUGH, MASSACHUSETTS

2009
SEDIMENT SAMPLING LOCATION MAP

ARCADIS

FIGURE
1

Table G-1. Summary of 2009 Sediment Sampling in Hocomonco Pond
Hocomonco Pond Site
Westborough, Massachusetts

	Location:	SED-1	SED-1A	SED-2	SED-2A	SED-3-4	SED-3-4 (dup)	SED-DSHP	SED-DSHP	SED-DSHP
	Depth:	0'-0.5'	0'-0.5'	0'-0.5'	0'-0.5'	0'-0.5'	0'-0.5'	0'-0.5'	0'-0.5'	0'-0.5'
Analyte	**Units**	7/2/2009	7/2/2009	7/2/2009	7/2/2009	7/2/2009	7/2/2009	7/2/2009	8/18/2009	8/18/2009
ACENAPHTHENE	UG/KG	430 J	3400	1900	330 J	420 U	410 U	1900	390 U	390 U
ACENAPHTHYLENE	UG/KG	1400 U	1300 U	1200 U	490 U	420 U	410 U	140 J	390 U	390 U
ANTHRACENE	UG/KG	1400 U	1300 U	1200 U	490 U	420 U	410 U	190 J	390 U	390 U
BENZ(A)ANTHRACENE*	UG/KG	1400 U	1300 U	1200 U	490 U	420 U	410 U	490 J	390 U	390 U
BENZO(A)PYRENE*	UG/KG	1400 U	1300 U	1200 U	490 U	420 U	410 U	280 J	390 U	390 U
BENZO(B)FLUORANTHENE*	UG/KG	1400 U	1300 U	1200 U	490 U	420 U	410 U	370 J	390 U	390 U
BENZO(G,H,I)PERYLENE	UG/KG	1400 U	1300 U	1200 U	490 U	420 U	410 U	1100 U	390 U	390 U
BENZO(K)FLUORANTHENE*	UG/KG	1400 U	1300 U	1200 U	490 U	420 U	410 U	340 J	390 U	390 U
CHRYSENE*	UG/KG	1400 U	1300 U	1200 U	490 U	420 U	410 U	600 J	390 U	390 U
DIBENZ(A,H)ANTHRACENE*	UG/KG	1400 U	1300 U	1200 U	490 U	420 U	410 U	1100 U	390 U	390 U
FLUORANTHENE	UG/KG	1400 U	180 J	1200 U	490 U	420 U	410 U	750 J	390 U	390 U
FLUORENE	UG/KG	1400 U	1600	1400	120 J	420 U	410 U	910 J	390 U	390 U
INDENO(1,2,3-CD)PYRENE*	UG/KG	1400 U	1300 U	1200 U	490 U	420 U	410 U	1100 U	390 U	390 U
NAPHTHALENE	UG/KG	9400	17000	9100	240 J	420 U	410 U	14000	390 U	390 U
PHENANTHRENE	UG/KG	1400 U	4100	1400	490 U	420 U	410 U	570 J	390 U	390 U
PYRENE	UG/KG	1400 U	160 J	1200 U	490 U	420 U	410 U	710 J	390 U	390 U
Total PAHs **	UG/KG	9830	26440	13800	690	ND	ND	21250	ND	ND
	mg/kg	9.8	26.4	13.8	0.69	ND	ND	21.3	ND	ND
Total cPAHs **	UG/KG	ND	ND	ND	ND	ND	ND	2080	ND	ND
	mg/kg	ND	ND	ND	ND	ND	ND	2.1	ND	ND
Phenanthrene	mg/kg	ND	4.1	1.4	ND	ND	ND	0.57	ND	ND

Notes:
* Carcinogenic PAH (cPAH)
** Assuming non-detects equal to zero
J = The compound was identified; however, the associated numerical value is an estimated concentration.
U = Compound not detected above reported sample quantitation limit.
ND = Not Detected
Source: Bollinger, 2009b

Beazer
Hocomonco Pond
Preliminary Sediment Results

COMPOUND	Units	SED-1 0'-0.5'	SED-1A 0'-0.5'	SED-2 0'-0.5'	SED-2A 0'-0.5'	SED-3-4 0'-0.5'	SED-3-4 (dup) 0'-0.5'	SED-DSHP 0'-0.5'
ACENAPHTHENE	UG/KG	430 J	3400	1900	330 J	420 U	410 U	1900
ACENAPHTHYLENE	UG/KG	1400 U	1300 U	1200 U	490 U	420 U	410 U	140 J
ANTHRACENE	UG/KG	1400 U	1300 U	1200 U	490 U	420 U	410 U	190 J
BENZ(A)ANTHRACENE	UG/KG	1400 U	1300 U	1200 U	490 U	420 U	410 U	490 J
BENZO(A)PYRENE	UG/KG	1400 U	1300 U	1200 U	490 U	420 U	410 U	280 J
BENZO(B)FLUORANTHENE	UG/KG	1400 U	1300 U	1200 U	490 U	420 U	410 U	370 J
BENZO(G,H,I)PERYLENE	UG/KG	1400 U	1300 U	1200 U	490 U	420 U	410 U	1100 U
BENZO(K)FLUORANTHENE	UG/KG	1400 U	1300 U	1200 U	490 U	420 U	410 U	340 J
CHRYSENE	UG/KG	1400 U	1300 U	1200 U	490 U	420 U	410 U	600 J
DIBENZ(A,H)ANTHRACENE	UG/KG	1400 U	1300 U	1200 U	490 U	420 U	410 U	1100 U
FLUORANTHENE	UG/KG	1400 U	180 J	1200 U	490 U	420 U	410 U	750 J
FLUORENE	UG/KG	1400 U	1600	1400	120 J	420 U	410 U	910 J
INDENO(1,2,3-CD)PYRENE	UG/KG	1400 U	1300 U	1200 U	490 U	420 U	410 U	1100 U
NAPHTHALENE	UG/KG	9400	17000	9100	240 J	420 U	410 U	14000
PHENANTHRENE	UG/KG	1400 U	4100	1400	490 U	420 U	410 U	570 J
PYRENE	UG/KG	1400 U	160 J	1200 U	490 U	420 U	410 U	710 J
Total PAH*	MG/KG	9.83	26.44	13.8	0.45			21.25
TOC	MG/KG	13200	2730	3500	11100	650	810	23500
Total PAH OC	MG/KG	745	9685	3943	41			904

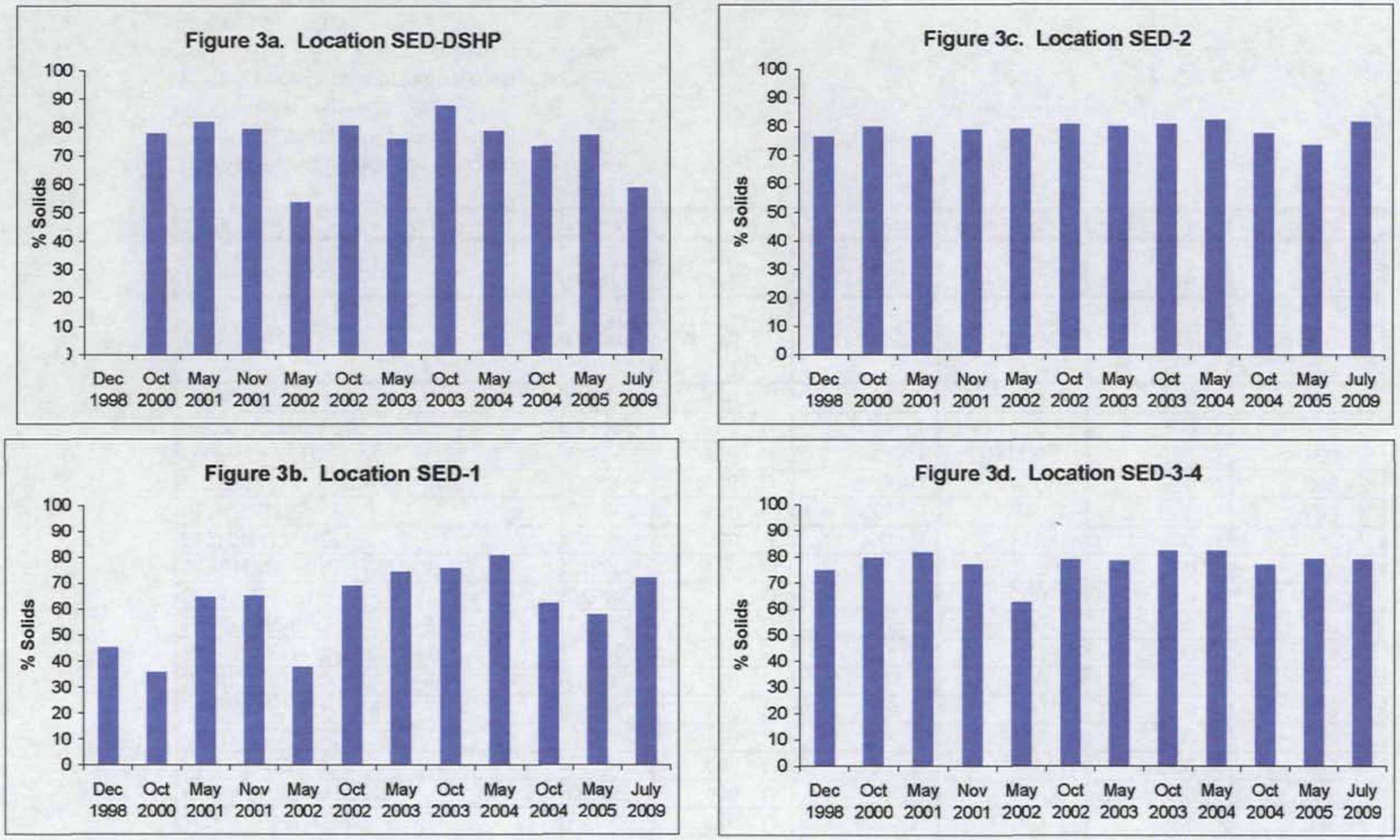
UG/KG = microgram per kilogram
MG/KG = milligram per kilogram
TOC = total organic carbon
PAH = polycyclic aromatic hydrocarbon
PAH OC = PAH organic carbon normalized
U = not detected
J = estimated
* = not detected equals zero

Beazer
Hocomonco Pond
Preliminary Re-sample Results of SED-DSHP

COMPOUND	Units	SED-DSHP 0'-0.5' 5/1/2005	SED-DSHP (dup) 0'-0.5' 5/1/2005	SED-DSHP 0'-0.5' 7/2/2009	SED-DSHP 0'-0.5' 8/18/2009	SED-DSHP (dup) 0'-0.5' 8/18/2009
ACENAPHTHENE	UG/KG	430 U	420 U	1900	390 U	390 U
ACENAPHTHYLENE	UG/KG	430 U	420 U	140 J	390 U	390 U
ANTHRACENE	UG/KG	430 U	420 U	190 J	390 U	390 U
BENZ(A)ANTHRACENE	UG/KG	430 U	75 J	490 J	390 U	390 U
BENZO(A)PYRENE	UG/KG	430 U	2 J	280 J	390 U	390 U
BENZO(B)FLUORANTHENE	UG/KG	430 U	2 J	370 J	390 U	390 U
BENZO(G,H,I)PERYLENE	UG/KG	430 U	420 U	1100 U	390 U	390 U
BENZO(K)FLUORANTHENE	UG/KG	430 U	2 J	340 J	390 U	390 U
CHRYSENE	UG/KG	430 U	2 J	600 J	390 U	390 U
DIBENZ(A,H)ANTHRACENE	UG/KG	430 U	420 U	1100 U	390 U	390 U
FLUORANTHENE	UG/KG	56 J	150 J	750 J	390 U	390 U
FLUORENE	UG/KG	430 U	420 U	910 J	390 U	390 U
INDENO(1,2,3-CD)PYRENE	UG/KG	430 U	420 U	1100 U	390 U	390 U
NAPHTHALENE	UG/KG	160 J	160 J	14000	390 U	390 U
PHENANTHRENE	UG/KG	430 U	120 J	570 J	390 U	390 U
PYRENE	UG/KG	430 U	160 J	710 J	390 U	390 U
Total PAH*	MG/KG	0.216	0.673	21.25		
TOC	MG/KG	2940	1860	23500	6010	3720
Total PAH OC	MG/KG	73	362	904		

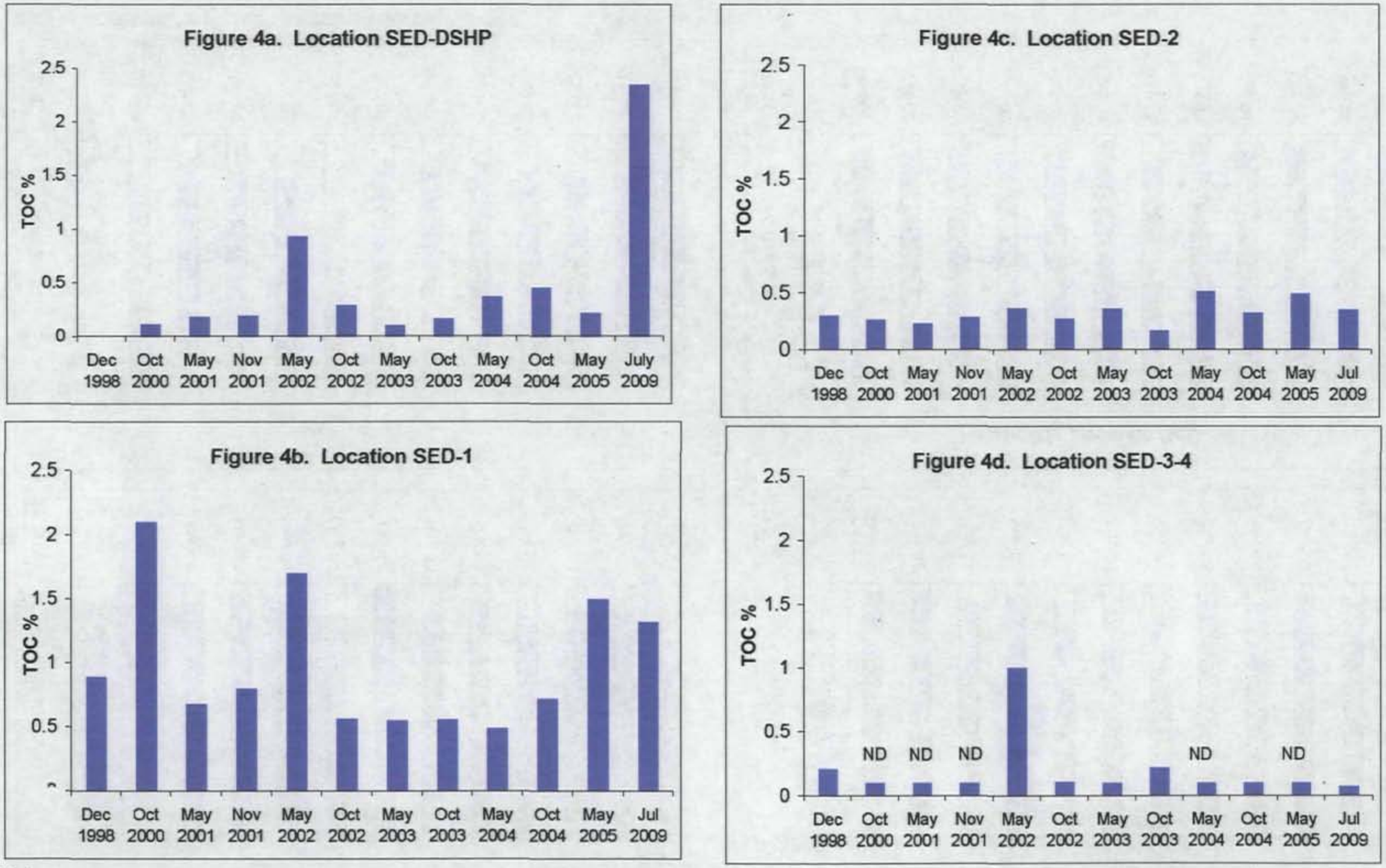
UG/KG = microgram per kilogram
MG/KG = milligram per kilogram
TOC = total organic carbon
PAH = polycyclic aromatic hydrocarbon
PAH OC = PAH organic carbon normalized
U = not detected
J = estimated
* = not detected equals zero

Figure 3. Percent Solids from 1998-2009, Hocomonco Pond (Preliminary Data)



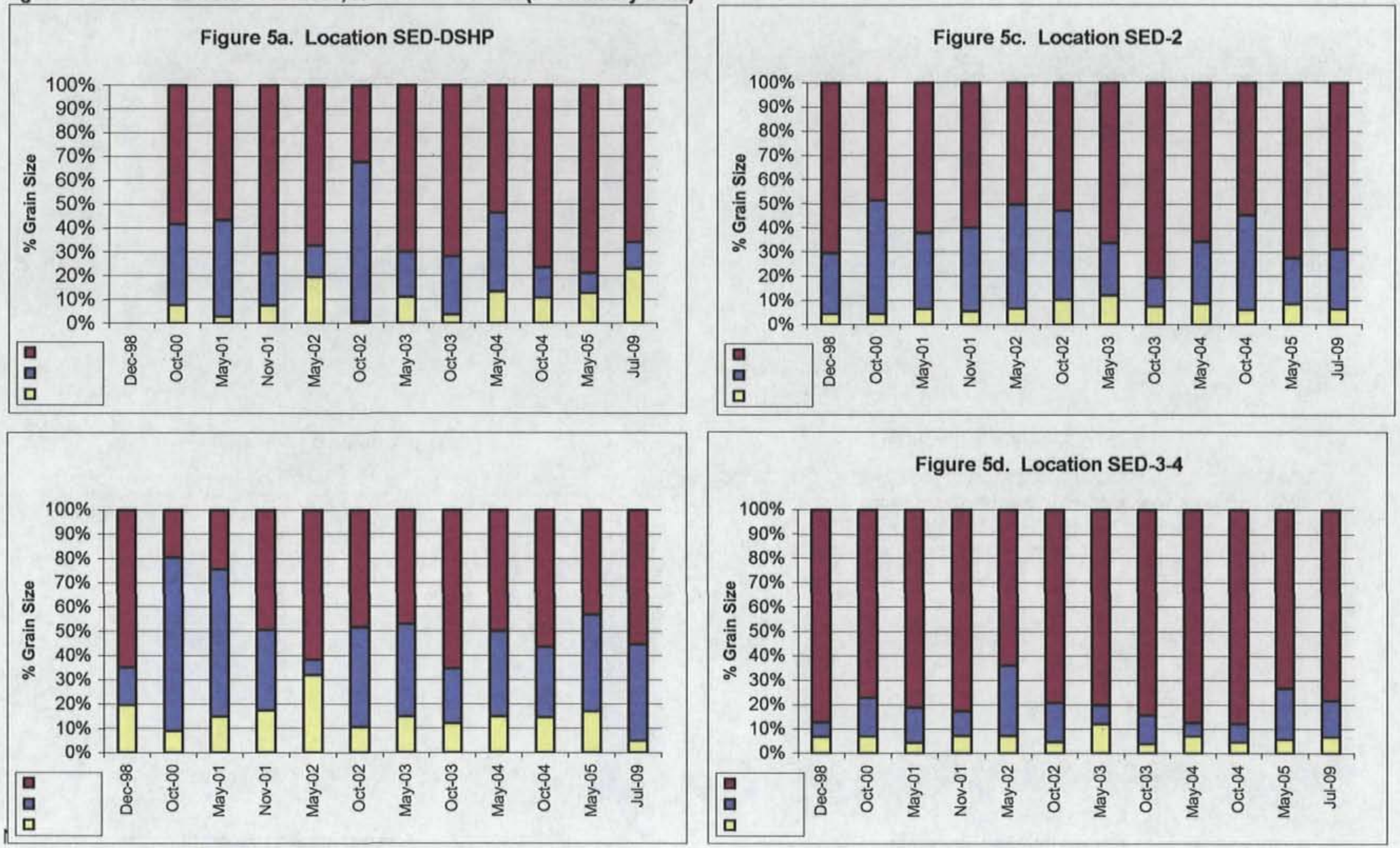
Notes:
NA: Not analyzed for in given sampling event.

Figure 4. Total Organic Carbon (%) from 1998-2009, Hocomonco Pond (Preliminary Data)



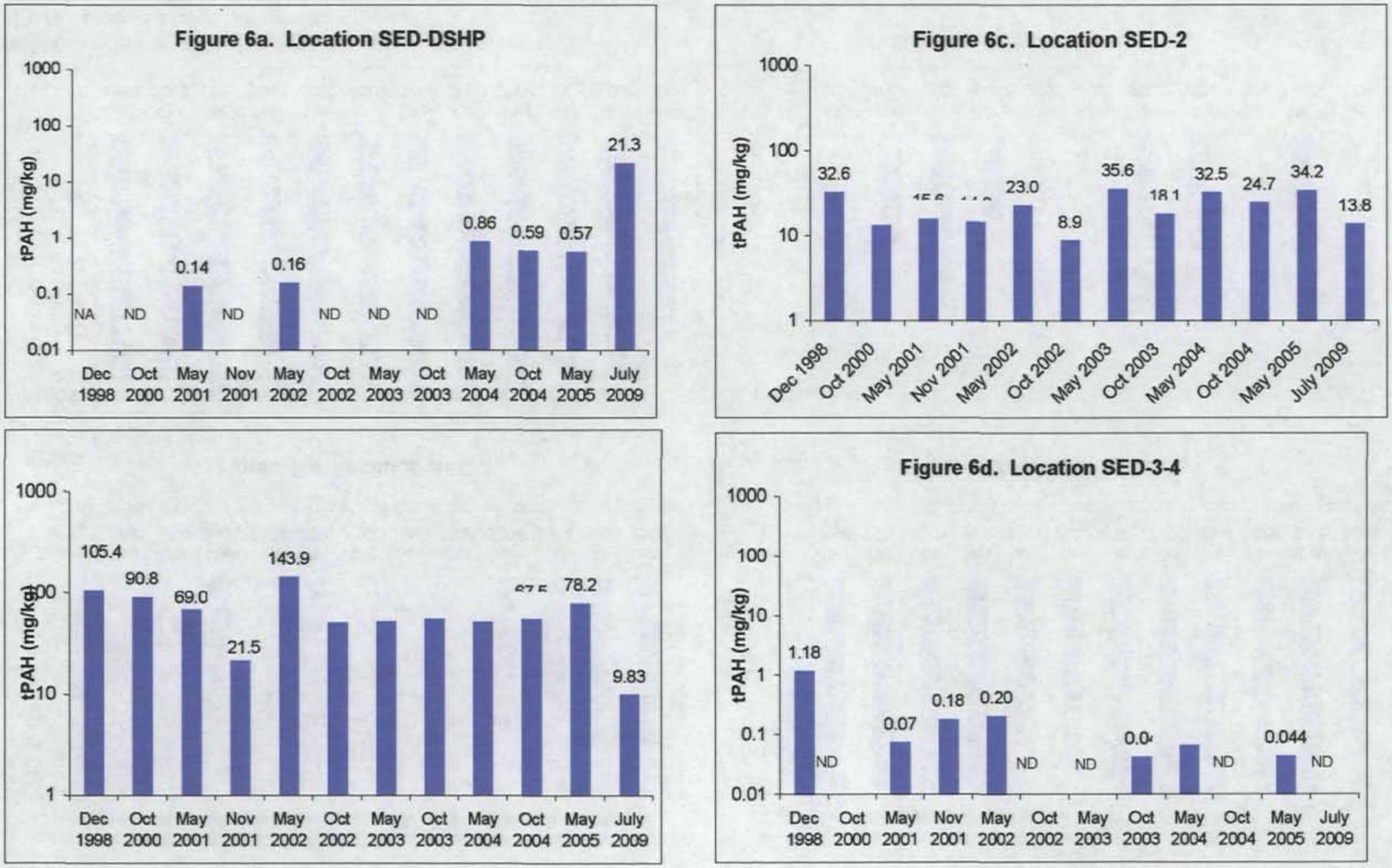
Notes:
NA: Not analyzed for in given sampling event.
ND: TOC was not detected in sampling event. Value is detection limit.

Figure 5. Grain Size from 1998-2009, Hocomonco Pond (Preliminary Data)



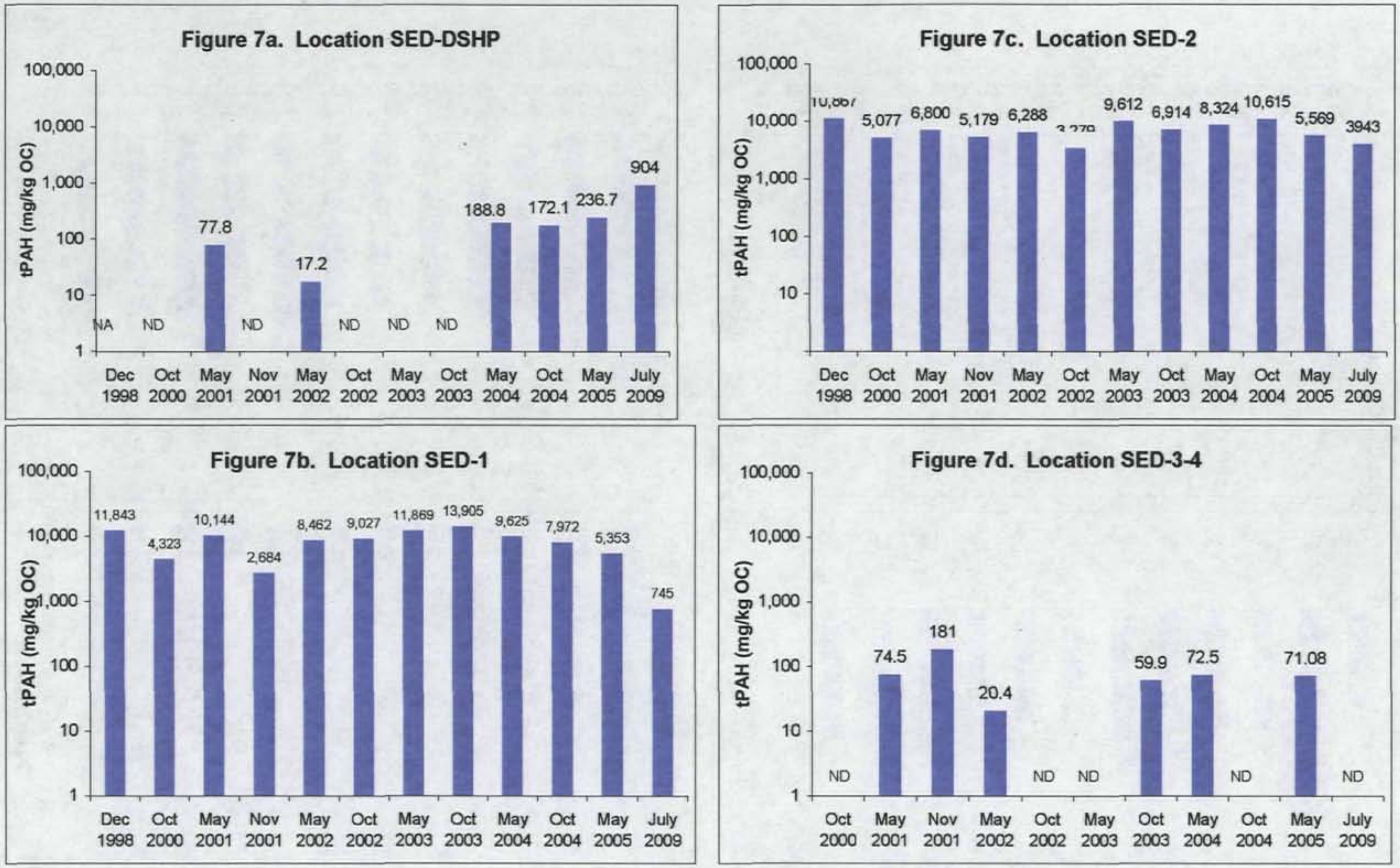
NA: Not analyzed for in given sampling event.

Figure 6. Total PAH from 1998-2009, ND=0, Hocomonco Pond (Preliminary Data)



Notes:
NA: Not analyzed for in given sampling event.
ND: PAH were not detected in sampling event.

Figure 7. Total PAH (Organic Carbon-Normalized) from 1998-2009, ND=0, Hocomonco Pond (Preliminary Data)

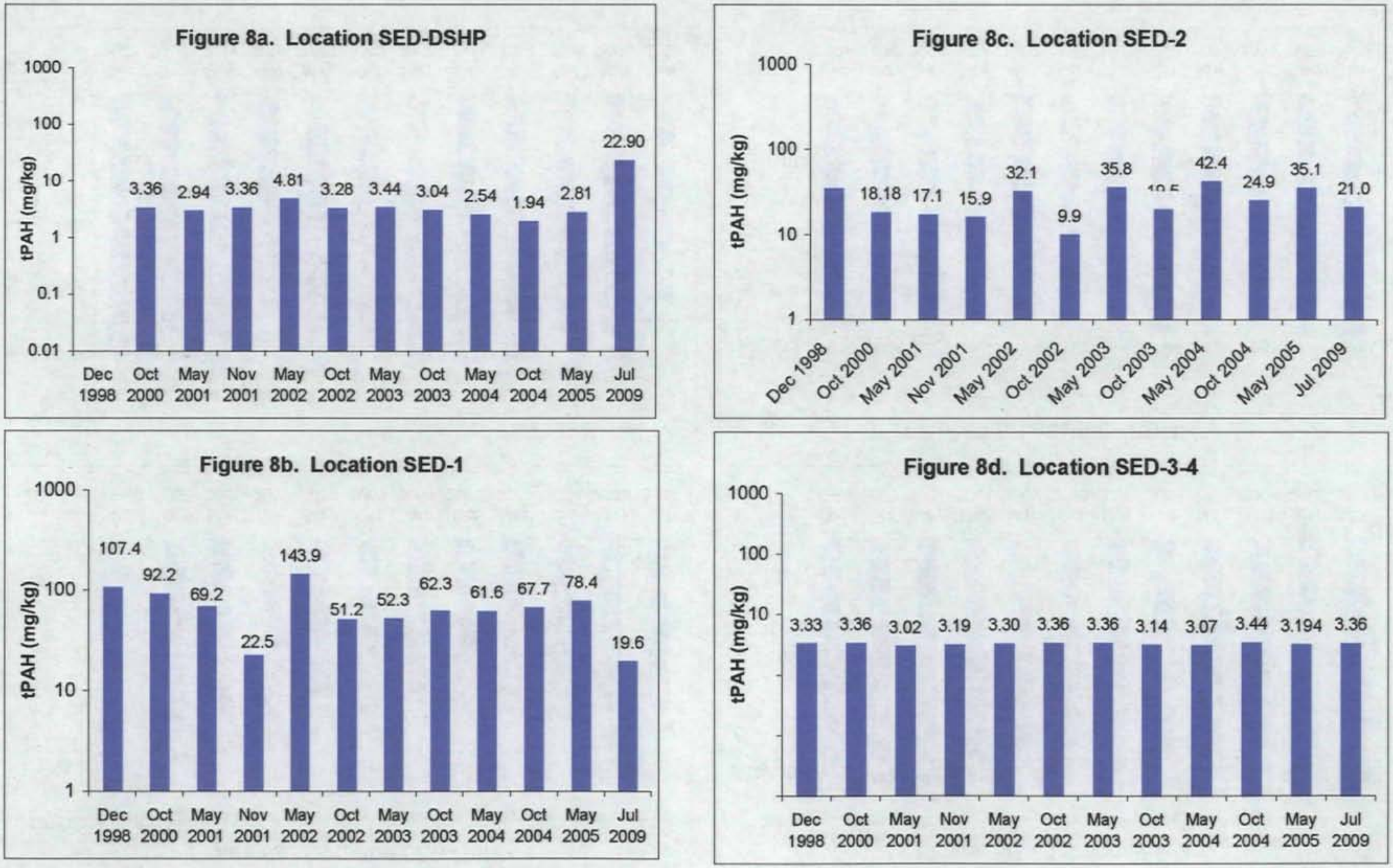


Notes:

NA: Not analyzed for in given sampling event.

ND: PAH were not detected in sampling event.

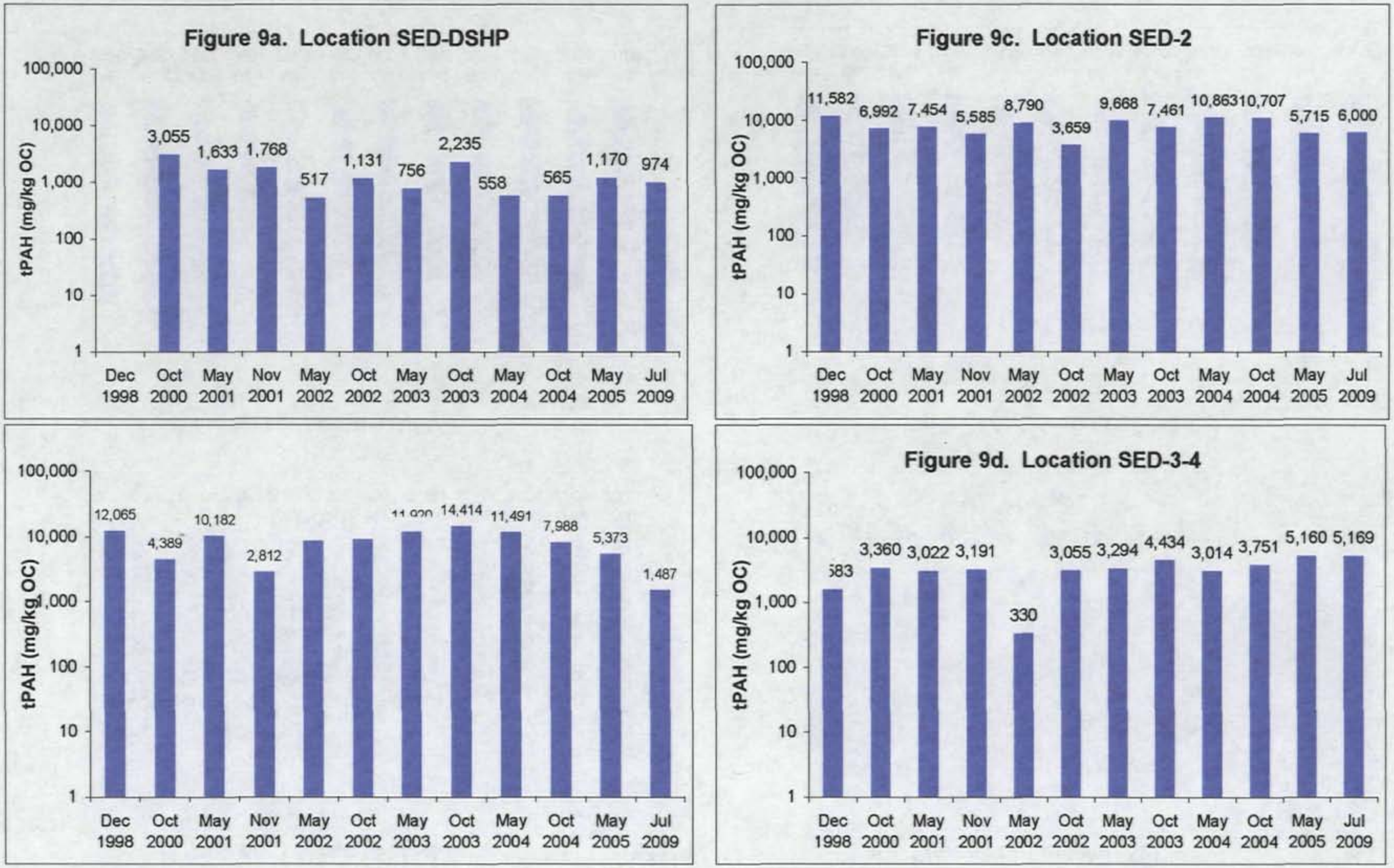
Figure 8. Total PAH from 1998-2009, 1/2 DL, Hocomonco Pond (Preliminary Data)



Notes:

NA: Not analyzed for in given sampling event.

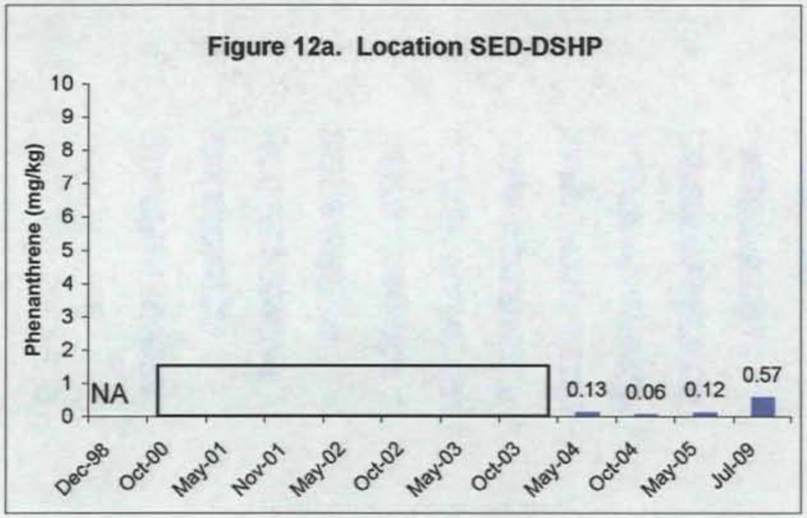
Figure 9. Total PAH (Organic Carbon-Normalized) from 1998-200p, 1/2 DL, Hocomonco Pond (Preliminary Data)

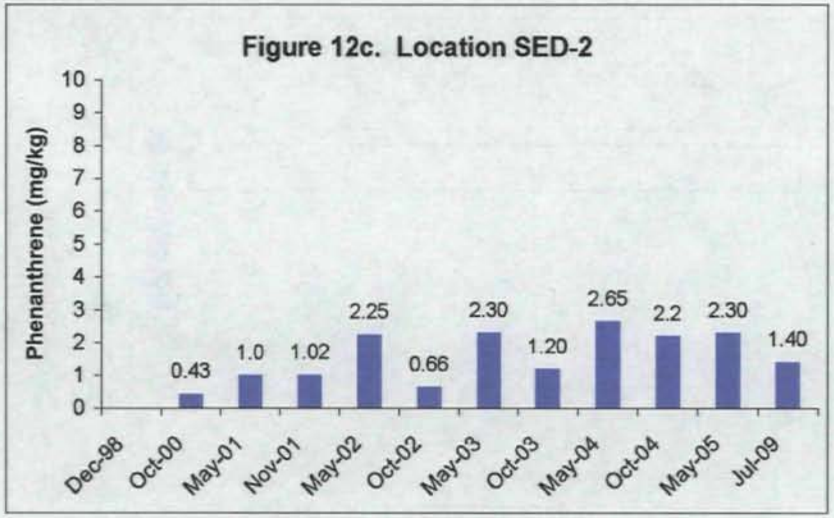


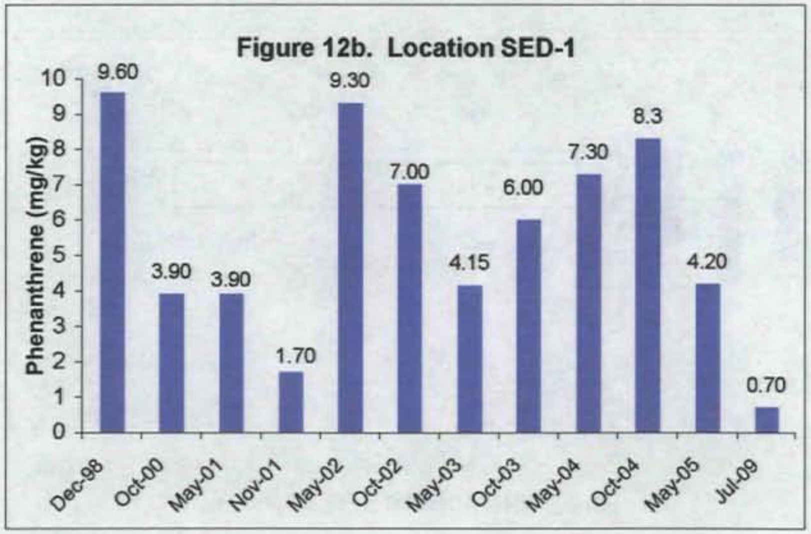
Notes:

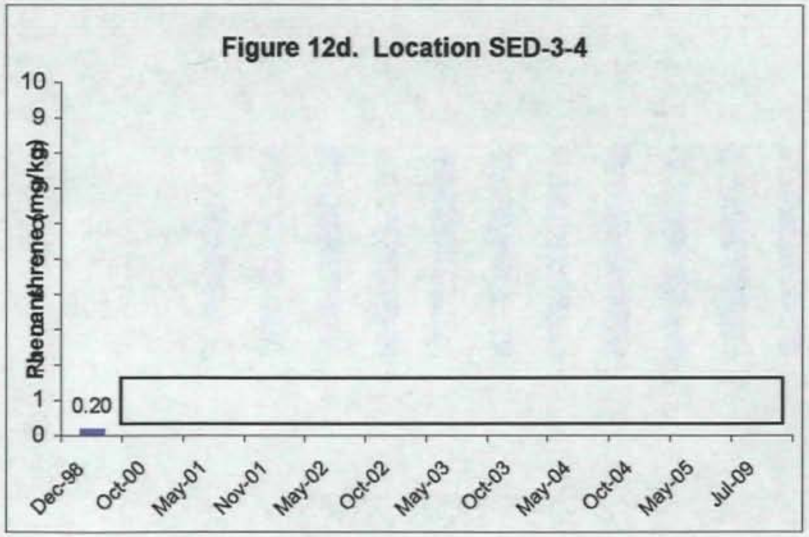
NA: Not analyzed for in given sampling event.

Figure 12. Phenanthrene from 1998-2009, ND=0, Hocomonco Pond (Preliminary Data)



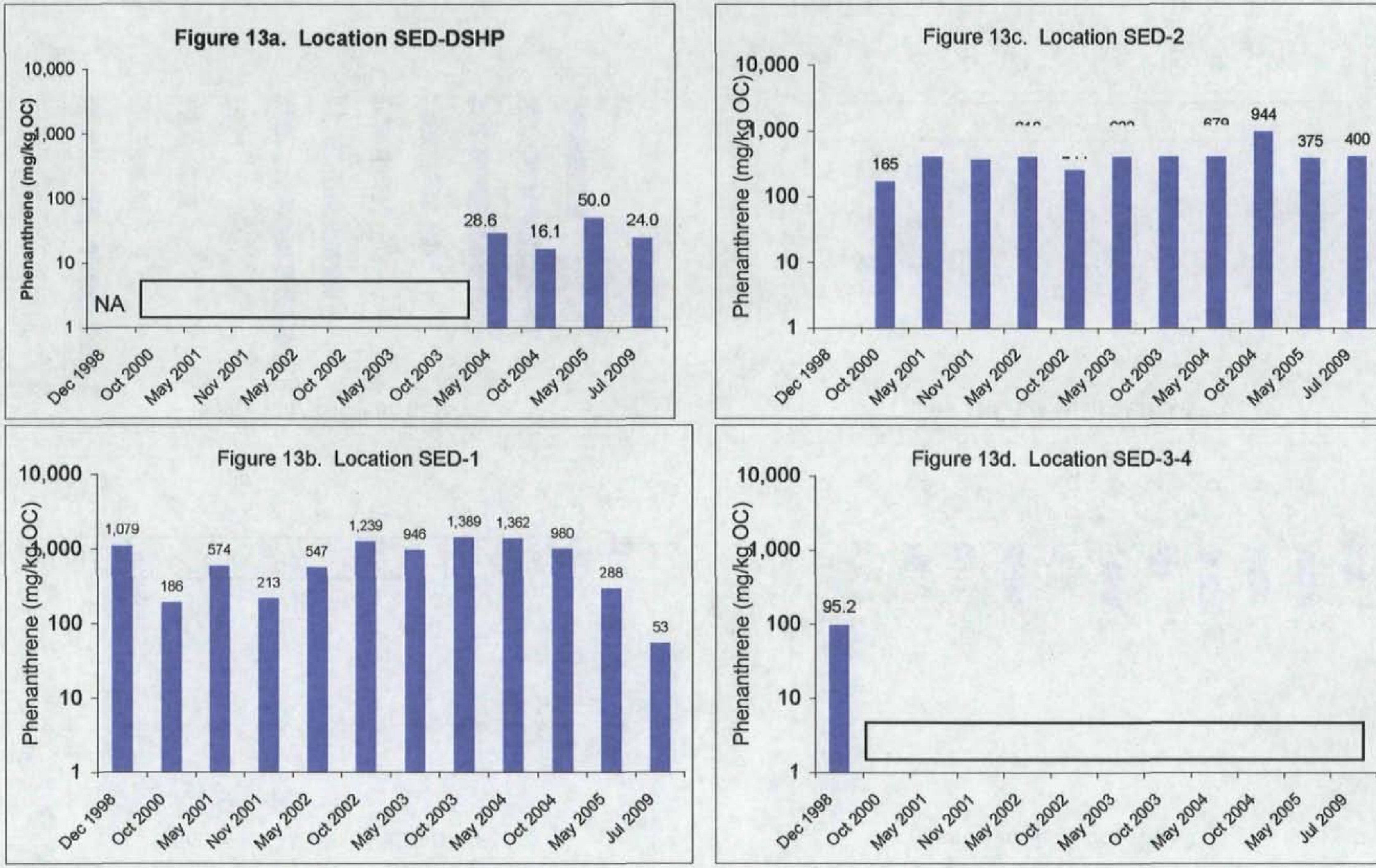






Notes:
NA: Not analyzed for in given sampling event.

Figure 13. Phenanthrene (Organic Carbon-Normalized) from 1998-2009, ND=0, Hocomonco Pond (Preliminary Data)



Notes:

NA: Not analyzed for in given sampling event.

ND: PAH were not detected in sampling event.

Figure 14. Phenanthrene from 1998-2009, 1/2 DL, Hocomonco Pond (Preliminary Data)

Figure 14a. Location SED-DSHP

Figure 14b. Location SED-1

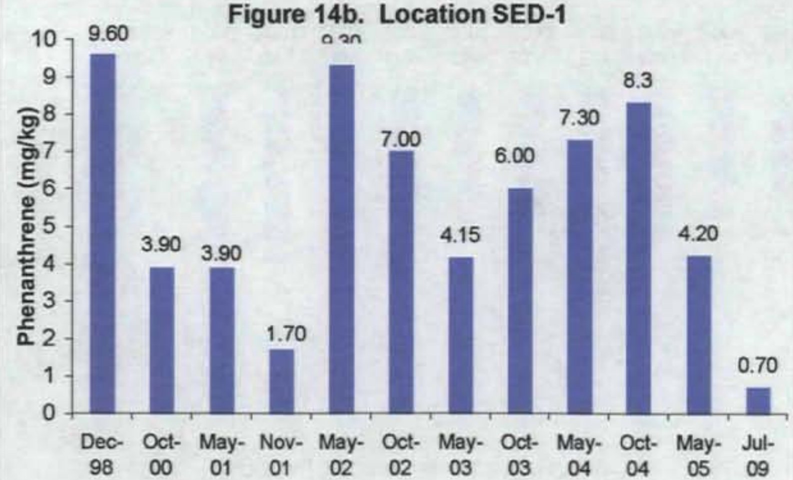
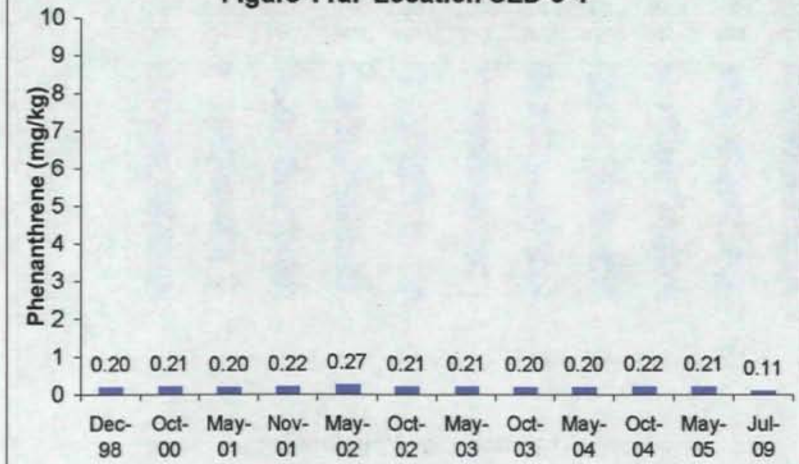


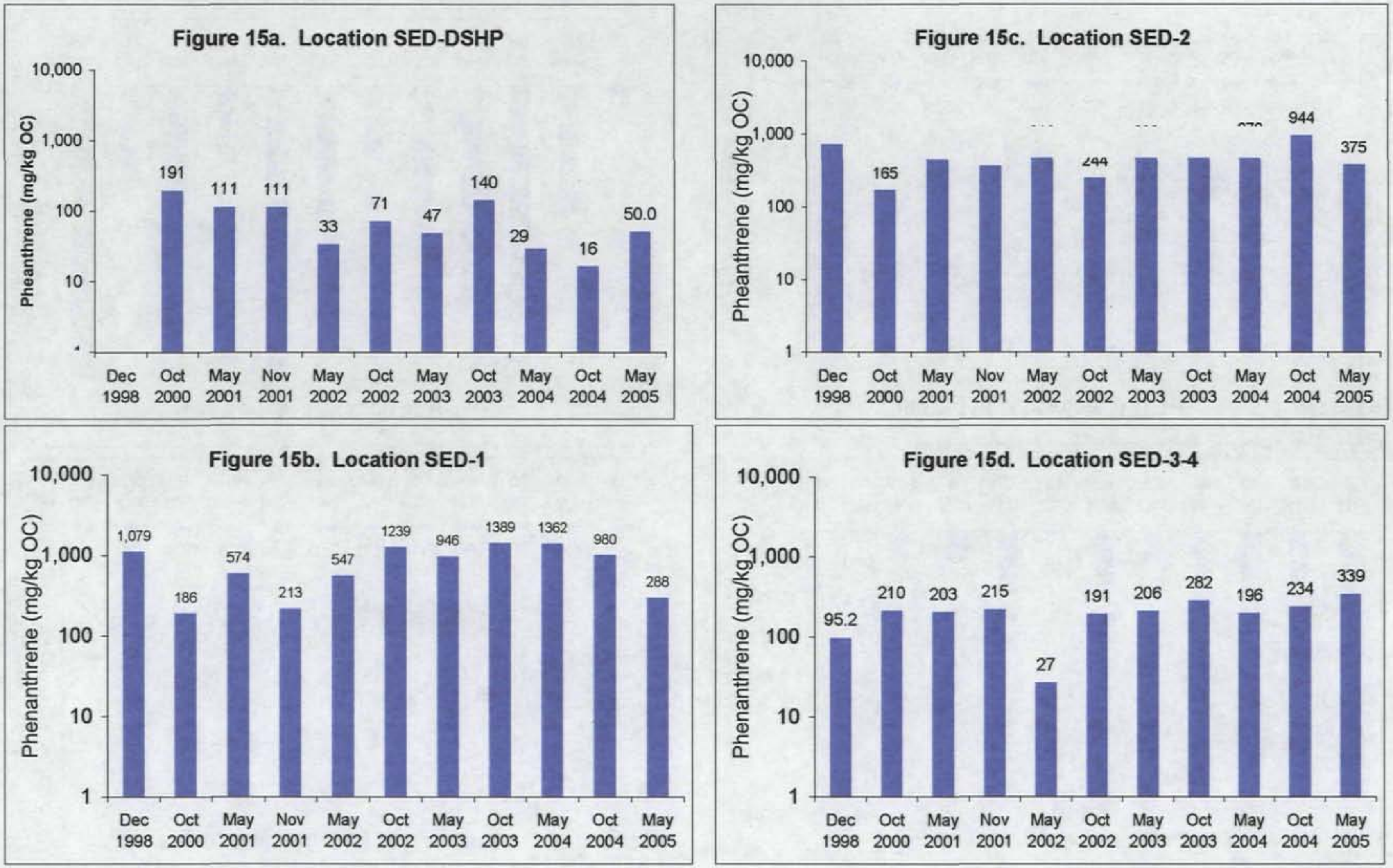
Figure 14c. Location SED-2

Figure 14d. Location SED-3-4



Notes:
NA: Not analyzed for in given sampling event.

Figure 15. Phenanthrene (Organic Carbon-Normalized) from 1998-2009, 1/2 DL, Hocomonco Pond (Preliminary Data)



Notes:
NA: Not analyzed for in given sampling event.

APPENDIX H

LETTER FROM THE TOWN OF WESTBOROUGH

TOWN OF WESTBOROUGH
MASSACHUSETTS

TOWN HALL - 34 WEST MAIN STREET
WESTBOROUGH, MA 01581-1998
TEL. (508) 366-3030 / FAX 508-366-3099

TOWN MANAGER
JAMES J. MALLOY

August 20, 2009

Jim DiLorenzo
Massachusetts Superfund Section
USEPA, Region 1 – New England
1 Congress Street, Suite 1100
Boston, MA 02114-2023

RE: Hocomonco Pond Site
Westborough MA

Dear Mr. DiLorenzo:

As per our discussion in July, I have forwarded a request to all departments relative to the building that is on the property now owned by the Town of Westborough and contains water filtration equipment previously used by the responsible party for remediation purposes.

Based upon the discussion during the site visit, it is our understanding that the responsible party no longer uses the equipment inside the building and that the USEPA no longer requires the use of this equipment by the responsible party. With this information, the Town's departments have not requested that the responsible maintain the equipment on site any further.

The Town departments have indicated the need to utilize the space inside the building for storage of town equipment and therefore would be supportive of having the equipment removed from the building as soon as the USEPA determines the equipment is no longer necessary.

Should you have any questions or need additional information, please do not hesitate to contact me. Thanks.

Sincerely,

James J. Malloy
Town Manager

Cc: Board of Selectmen
Board of Health
DPW Manager